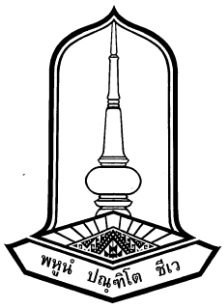


COMPARATIVE ETHNOBOTANY OF THE SEVEN ETHNIC GROUPS IN NAKHON PHANOM PROVINCE

RAPEEPORN PHOLHIAMHAN

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Biodiversity

at Mahasarakham University

July 2017

COMPARATIVE ETHNOBOTANY OF THE SEVEN ETHNIC GROUPS IN NAKHON PHANOM PROVINCE

BY

RAPEEPORN PHOLHIAMHAN

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Biodiversity at Mahasarakham University

July 2017

The examining committee has unanimously approved this dissertation, submitted by Mrs. Rapeeporn Pholhiamhan, as a partial fulfillment of the requirements for the Doctor of Philosophy degree in Biodiversity at Mahasarakham University.

Examining Committee

.....	Chairman
(Usa Thongpirot, Ph.D.)	(Faculty graduate committee)
.....	Committee
(Asst.Prof.Surapon Saensouk, Ph.D.)	(Advisor)
.....	Committee
(Asst.Prof.Piyaporn Saensouk, Ph.D.)	(Co-advisor)
.....	Committee
(Sombat Appamaraka, Ph.D.)	(Faculty graduate committee)
.....	Committee
(Charun Maknoi, Ph.D.)	(External expert)

Mahasarakham University has granted approval to accept this dissertation as a partial fulfillment of the requirements for the Doctor of Philosophy degree in Biodiversity

.....	.....
(Assoc.Prof.Weerachai Saijuntha, Ph.D.)	(Prof. Pradit Terdtoon, Ph.D.)
Director of Walai Rukhavej Botanical Research Institute	Dean of Graduate School
	..... July 31, ...2017

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude and deep appreciation to my advisor, Asst.Prof. Dr. Surapon Saensouk, for his guidance, patience, financial support and valuable suggestions in regard to the main conduct of my research and the preparation of this dissertation. My deep appreciation is expressed to my co-advisor, Asst.Prof. Dr. Piyaporn Saensouk, for her supervision and valuable suggestions during my study. I am highly grateful to Walai Rukhavej Botanical Research Institute, Mahasarakham University, Thailand for allowing me to use their facilities during the field work. I would like to thank all informants for their support and sharing their valuable knowledge. This research was financially supported by Mahasarakham University 2016. Thank you Renu Nakhon Wittayanukul School for supporting this research and thank you Dr. Auemporn Junsongduang and Mr. Tasanai Panjansing for aiding in data analysis. Thanks to the seven ethnic groups for information. The authors are indebted to Miss Mary Keonouphet and Mr.Benjamin Marchetti for their review and correction of the manuscript. I wish express very special thanks to my father, mother, husband and my family for their love, sacrifice and patient support towards the success of my study.

Rapeeporn Pholhiamhan

ชื่อเรื่อง การเปรียบเทียบพฤกษศาสตร์พื้นบ้านของ 7 ชนเผ่าในจังหวัดนครพนม
ผู้วิจัย นางระพีพร พลเหี้ยมหาญ
ปริญญา ปรัชญาดุษฎีบัณฑิต สาขาวิชา ความหลากหลายทางชีวภาพ
อาจารย์ที่ปรึกษา ผู้ช่วยศาสตราจารย์ ดร.สุรพล แสนสุข
ผู้ช่วยศาสตราจารย์ ดร.ปิยะพร แสนสุข
มหาวิทยาลัย มหาวิทยาลัยมหาสารคาม **ปีที่พิมพ์** 2560

บทคัดย่อ

การวิจัยครั้งนี้มีความมุ่งหมายเพื่อรวบรวมข้อมูลความหลากหลายทางชีวภาพของพืชที่ชนเผ่าในจังหวัดนครพนมนำมาใช้ประโยชน์ ศึกษาความสัมพันธ์ของเพศและอายุกับความรู้เรื่องการใช้ประโยชน์จากพืช และการเปรียบเทียบความคล้ายคลึงกันของพืชที่ชนเผ่านำมาใช้ประโยชน์ ศึกษาและเก็บรวบรวบข้อมูลในช่วงเดือนมกราคม 2558 ถึงเดือนธันวาคม 2558 โดยการสำรวจ สอบถาม สัมภาษณ์ บันทึกข้อมูล เก็บรวบรวมข้อมูล จากชนเผ่าทั้งหมด 7 ชนเผ่าคือ ผู้ไทย ญ้อ แสก โส้ กะเลิง ข่า และไทยอีสานที่อาศัยอยู่ในจังหวัดนครพนม จำนวนทั้งสิ้น 292 คน สถิติที่ใช้ในการวิเคราะห์ข้อมูลคือสถิติพื้นฐาน ความถี่ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐานและร้อยละ ค่าสถิติ Independent sample t- test และ one way ANOVA จากโปรแกรม SPSS และดัชนีความสำคัญทางวัฒนธรรม (Cultural Index, CI) และ ดัชนีความคล้ายคลึง (Jaccard Index, JI) ผลการวิจัยพบว่าชนเผ่าในจังหวัดนครพนม มีการใช้ประโยชน์จากพืช จำนวน 356 ชนิด จาก 93 วงศ์ วงศ์ที่พบมากที่สุดคือวงศ์ Fabaceae จำนวน 45 ชนิด คิดเป็น 12.57 % รองลงมาคือวงศ์ Zingiberaceae จำนวน 21 ชนิดคิดเป็น 5.87 % และ วงศ์ Poaceae 15 ชนิด คิดเป็น 4.19 % ตามลำดับ พืชที่ใช้ในด้านอาหารจำนวน 206 ชนิด ใช้เป็นยารักษาโรคจำนวน 203 ชนิด ใช้ในวัฒนธรรมจำนวน 63 ชนิด และใช้ในด้านอื่นๆ จำนวน 83 ชนิด จากการศึกษาค่าดัชนีความสำคัญทางวัฒนธรรม (CI) พบว่าพืชที่มีความสำคัญทางวัฒนธรรมของชนเผ่ามากที่สุดคือกล้วยน้ำว้า (*Musa balbisiana*) (CI = 2.678) รองลงมาคือ กล้วยตานี (*Musa × paradisiaca* L.) (CI = 2.637) และข้าว (*Oryza sativa* L.) (CI = 2.603) ตามลำดับ เนื่องจากกล้วยเป็นพืชที่มีการใช้ในด้านต่างๆที่หลากหลาย เช่น เป็นอาหาร ยารักษาโรค ใช้ในพิธีกรรมชนเผ่า ด้านอื่นๆ โดยเฉพาะข้าว (*Oryza sativa* L.) ซึ่งถือว่าเป็นอาหารหลักของชนเผ่า ส่วนของพืชที่นำมาใช้ประโยชน์มากที่สุดคือใบ ผล และลำต้น ตามลำดับ ลักษณะวิสัยของพืชที่นำมาใช้ประโยชน์ที่พบมากที่สุดคือไม้ต้น รองลงมาคือไม้ล้มลุก และไม้เลื้อย ในการใช้ประโยชน์จากพืชของชนเผ่าต่างๆนั้นพบว่าจะนำมาปลูกใช้ในครัวเรือนมากกว่าการนำมาจากป่าโดยตรง และจากการศึกษาความสัมพันธ์ของเพศและอายุกับความรู้เรื่องการใช้ประโยชน์จากพืชพบว่าเพศหญิงและเพศชายมีความรู้เรื่องการใช้ประโยชน์จากพืชไม่แตกต่างกัน และคนที่มีอายุแตกต่างกันจะมีความรู้เรื่องการใช้ประโยชน์จากพืชที่แตกต่างกันอย่างมีนัยสำคัญทางสถิติที่ระดับ.05 โดยช่วงอายุมากจะมีความรู้เรื่องการใช้ประโยชน์จากพืชมากกว่าคนที่มีอายุน้อย จากการเปรียบเทียบความรู้เรื่องการใช้ประโยชน์จากพืชของทั้ง 7 ชนเผ่าพบว่าไม่มีความแตกต่างกัน และจากการเปรียบเทียบความคล้ายคลึงกันของการใช้พืชโดยใช้ดัชนีความคล้ายคลึง พบว่าชนเผ่าที่มีการใช้พืชในด้านการเป็นอาหารคล้ายกันมากที่สุดคือชนเผ่าผู้ไทยกับญ้อ (JI = 0.956) และชนเผ่าที่มีการใช้พืชในด้านการเป็นอาหารคล้ายกันน้อยที่สุดคือชน

เผ่ากะเลิงกับผู้ไทย และญ้อกับข่า (JI = 0.898) ชนเผ่าที่มีการใช้พืชในด้านการเป็นยารักษาโรคคล้ายกันมากที่สุดคือชนเผ่าผู้ไทยและญ้อ (JI = 0.973) และชนเผ่าที่มีการใช้พืชในด้านการเป็นยารักษาโรคคล้ายกันน้อยที่สุดคือชนเผ่ากะเลิงกับแสก (JI = 0.581) นอกจากนี้พบว่าชนเผ่าที่มีการใช้พืชในด้านวัฒนธรรมคล้ายกันมากที่สุดคือชนเผ่ากะเลิงกับญ้อ (JI = 0.793) และชนเผ่าที่มีการใช้พืชในด้านวัฒนธรรมคล้ายกันน้อยที่สุดคือชนเผ่าผู้ไทยกับกะเลิง (JI = 0.698) และ ชนเผ่าที่มีการใช้พืชในด้านอื่นๆคล้ายกันมากที่สุดคือชนเผ่าข่ากับแสก (JI = 0.988) และชนเผ่าที่มีการใช้พืชในด้านการประโยชน์ด้านอื่นๆคล้ายกันน้อยที่สุดคือชนเผ่าผู้ไทยกับกะเลิง (JI = 0.639) ข้อมูลที่ได้เป็นจะประโยชน์ต่อเศรษฐกิจของชนเผ่าแล้วนอกจากนี้ความรู้เรื่องการใช้พืชในด้านต่างๆ เช่น การเป็นยารักษาโรค ด้านอาหาร ด้านวัฒนธรรมและด้านอื่นๆ จะได้มีการเผยแพร่ความรู้และถ่ายทอดจากบรรพบุรุษจากรุ่นสู่รุ่นต่อไป

คำสำคัญ : พืชที่ใช้เป็นยารักษาโรค, พืชที่รับประทานได้, พืชในวัฒนธรรม, ประโยชน์ด้านอื่นๆ, ความรู้พื้นบ้าน, ดัชนีความสำคัญทางวัฒนธรรม(CI), ดัชนีความคล้ายคลึง(JI)

TITLE Comparative Ethnobotany of the Seven Ethnic Groups in Nakhon Phanom Province
AUTHOR Mrs. Rapeeporn Pholhiamhan
DEGREE Doctor of Philosophy degree in Biodiversity
ADVISORS Asst.Prof. Surapon Saensouk, Ph.D.
Asst.Prof. Piyaporn Saensouk, Ph.D.
UNIVERSITY Mahasarakham University **YEAR** 2017

ABSTRACT

The objectives of the present study are to examine plant diversity that are used by the ethnic groups in Nakhon Phanom province by studying the relationship between gender, age, and indigenous knowledge of the ethnic groups. A comparative study was also conducted on the knowledge of ethnobotany from the different ethnic groups. A field survey was conducted from January 2015 through December 2015. Information was gathered through observations, participation, and interviews from 292 informants. Data was analyzed by using frequency, mean, standard deviation, and percentage. The statistical program SPSS for windows, independent-samples t-test, and one-way ANOVA were used to determine indigenous knowledge between genders and age respectively. The Cultural Index (CI) was used to estimate the significance of each species and UPGMA Cluster Analysis based on Jaccard's similarity index (JI) was used to compare similarity of plant species. The results found that there were 358 plant species in 93 families that the ethnic groups used in their daily lives. The largest number of plants species came from Fabaceae (45 species, 12.57 %), followed by Zingiberaceae (21 species, 5.87 %), and Poaceae (15 species, 4.19 %). 208 species were used for ingestion, 203 species for medicine, 63 species for cultural purposes, and 83 species for other uses. The highest of cultural important index (CI) was Kluai Namwa (*Musa balbisiana*) (CI = 2.678) followed by Kluai Tani (*Musa* × *paradisiaca* L.) (CI = 2.637), and Khao (*Oryza sativa* L.) (CI = 2.603). Leaves, fruits, and stems were the plant parts most used respectively. Tree was the most common plant habit, followed by the herb, and climber. The plants were gathered through cultivation more than from the forest. The ethnobotanical knowledge listed by males and females

did not differ significantly (p>.05). The Older informants had significantly more knowledge of plants use than younger informants. Ethnobotanical knowledge among the 7 ethnic groups did not differ significantly (p>.05). The highest similarity of edible plant species was between Phu Thai and Yaw (JI = 0.956), while the lowest was between Kaleung and Phu Thai, and Yaw and Kha (JI = 0.898). The similarity of medicinal plant species used between Phu Thai and Yaw had the highest similarity (JI = 0.973), while the Kakeung and Sak had the lowest similarity (JI = 0.581). The similarity of cultural plant species used between Kaleung and Yaw had the highest similarity (JI = 0.793), while the Kha and Sak, and the Phu Thai and Kaleung had the lowest similarity (JI = 0.698). The similarity of other plant species used between Kaleung and Yaw, and Kha and Sak had the highest similarity (JI = 0.988), while the Phu Thai and Kaleung had the lowest similarity (JI = 0.639).

This study provides interesting use of plants among the ethnic groups and its surrounding areas. The use of plants and the results obtained will contribute to the economy of the ethnic groups. Since the local people, especially in ethnic groups, are poor and do not have health care, they use the plants to treat illnesses, for cultural purposes, prepared in food, and other uses. Also, this study will pave the way for future generations.

Keywords : medicinal plants, edible plants, cultural plants, other use, indigenous knowledge, cultural important index (CI), Jaccard index (JI)

CONTENTS

CONTENTS (continued).

List of Tables

List of Figures

List of Figures (continued).

List of Figures (continued).

Page

CHAPTER 1

INTRODUCTION

1.1 Background and rationale of the study

Thailand is one of the most important biodiversity study resources. It has a rich resource of many economical crops, medicinal plants, and herbs that provides a basic factor for living. Most of the foods, clothes, materials for buildings, and medicines are made of plants. Furthermore, some plants play an important role in traditional cultures and faith-based lifestyles for many ethnic groups in Thailand. The utilization of plants has been developed through learning and an accumulation of experiences for surviving.

Ethnobotany is the science of people's interaction with plants and how people of a particular culture and region make use of indigenous plants (Bennett, 1896). The focus of ethnobotany is mainly how to use plants, how they are managed, and how they are perceived. Plants have many uses such as food, medicine, shelter, dyes, fibers, oils, resins, gums, soaps, waxes, latex, tannins, and even contribute to the air we breathe. In addition, many native people use plants in ceremonial or spiritual rituals. Ethnobotany also includes the knowledge from ethnic groups, which is obtained through learning by observation, experiences, and trial and errors. This kind of knowledge is called indigenous knowledge.

Indigenous knowledge represents humanity's heritage and diversity. Indicators of well-being; such as health and the management of natural resources, cultural anthropologists, conservation biologists, and psychologists have estimated long-term (secular) changes of indigenous knowledge and, importantly, have tried to understand why it might wane (Godoy *et al*., 2009). The study of ethnobotany in Thailand is not very prevalent except in the northern regions due to the vast amount of ethnic groups. Few studies focus on the northeastern regions as many areas have not been explored.

Nakhon Phanom province is located in the Northeastern part of Thailand and it borders Laos People's Democratic Republic. It is on the bank of the international Mae Khong River. According to its geography and history, this province has become a province of biodiversity of plants, cultural identities and multiple ethnic groups. There

are seven ethnic groups in Nakhon Phanom province including Phu Thai, Kaleung, Kha, Sak, So, Yaw and Thai I-San. The lifestyles of these ethnic groups are related to each other in how they have learned to use local plants for existence. The obtained indigenous knowledge of each ethnic group will be passed from the generation to generation. However, only a little of this indigenous knowledge has been documented. The change in social norms and development of technology in information, communication, medical, and public utilities in response to human demand is an important factor that has caused a decrease in the dependence on nature and the use of local plants. Therefore, this research will be conducted on the ethnobotany of seven ethnic groups in Nahon Phanom by mean of interview to study the knowledge of local plant utilization, to compare between gender, age, and indigenous knowledge of edible plants, medicinal plants and cultural plants of the seven ethnic groups in Nakhon Phanom. The obtained botanical data in this study has been documented to preserve important information. Ethnobotany is expected to be the economical plants of the future.

.

1.2 Research question

The research questions are

1. What species are used by the ethnic group?
2. What is the traditional plant and indigenous knowledge used by the ethnic groups?
3. Which plants are the culturally important or the widely used species for each ethnic group?
4. Is there any similarity in the plant uses among the different ethnic groups?

1.3 Hypothesis

Hypothesis of this research are as follow;

1. The relationship between gender, age and indigenous knowledge of the ethnic groups in Nakhon Phanom province is different.
2. The plants species to be used in the ethnic groups are similar.

1.4 Objectives of the study

1. To study plants diversity, which were used by the ethnic groups in Nakhon Phanom province.

2. To study the relationship between gender, age and indigenous knowledge of the ethnic groups in Nakhon Phanom province.

3. To do a comparative study on the ethnobotany of the ethnic groups in Nakhon Phanom province.

1.5 Conceptual Framework

The study ethnobotany of the ethnic groups; Phu Thai, Kaleung, So, Sak, Yaw, Kha and Thai I-San in Nakhon Phanom province started between 2015 and 2016. (Figure 1.1)

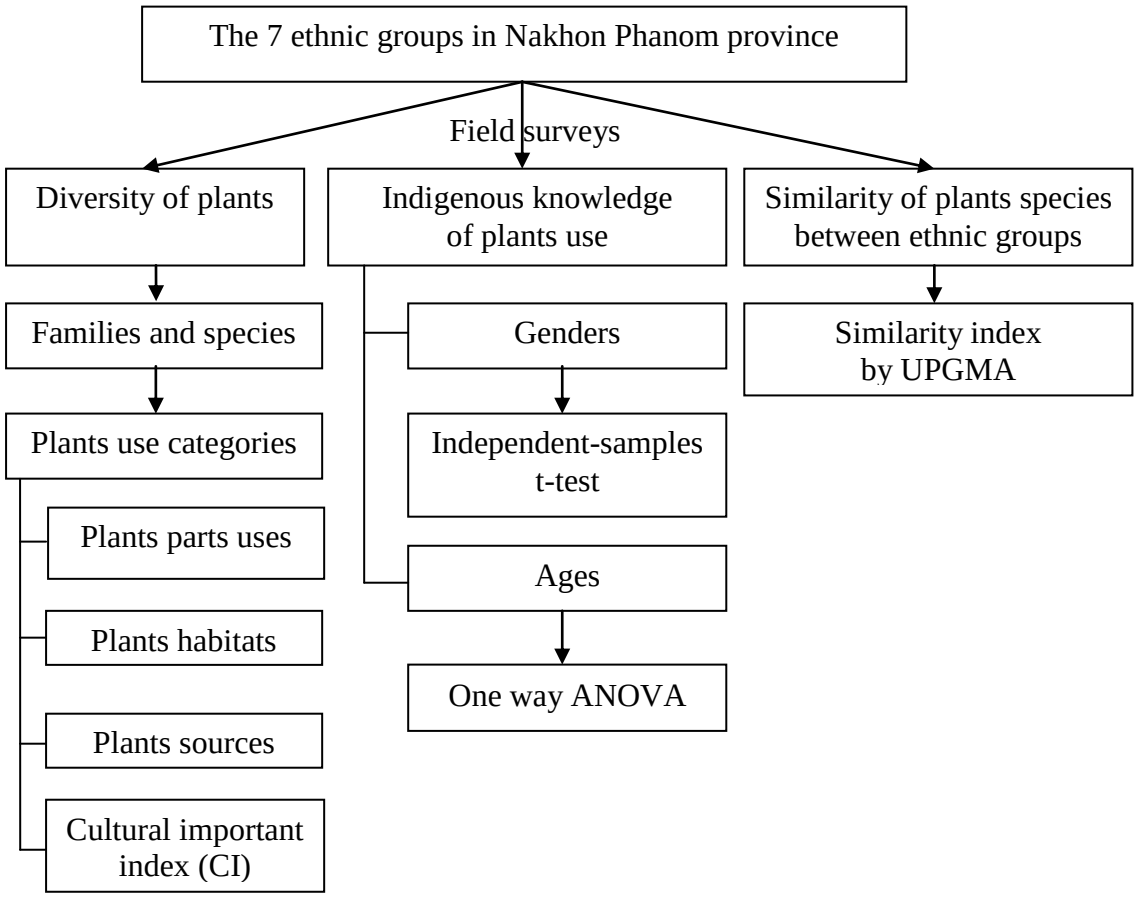


Figure 1.1 Conceptual framework

1.6 Anticipated benefit

1. Information about the biodiversity of plants that the ethnic groups in Nakhon Phanom province utilized.

2. Information on the relationship between gender and age, and indigenous knowledge of the ethnic groups in Nakhon Phanom province.

3. Get informed about the use of plants from each ethnic group.

4. A guide to conserving the biodiversity of plants in Nakhon Phanom province.

1.7 Terminology

The 7 ethnic groups in Nakhon Phanom province mean indigenous tribes who live in Nakhon Phanom Province namely Phu Thai, Kaleung, Kha, Sak, So, Yaw and Thai I-San.

CHAPTER 2

LITERATURE REVIEWS

2.1 Ethnobotany

The term ethnobotany comes from the Greek word Ethnos, which means people, and Botane which means herb or and plants, so literally it would be translated as the study of people and herbs. It was coined in 1895 by American taxonomic botanist John W. Harshberger as the study of the utilitarian relationship between human beings and vegetation in their environment, including medicinal uses (Harshberger, 1896).

A sister discipline of ethnobotany is economic botany. While the definition of the two disciplines is similar, the main difference of ethnobotany is that it is more concerned in understanding and taking in account local viewpoint and perceptions rather than only the scientific viewpoint. What is often referred in academic literature as the distinction between the emic and the etic viewpoint?

The study of how plants are used dates back centuries ago. For example, the many medical herbal traditions of knowledge compiled in human history can be considered ethnobotanical work. The founding father of ethnobotany as an academic discipline is considered to be Richard Evans Schultes (1915-2001). Schultes, a Harvard trained botanist, spent years documenting the indigenous use of plants in the Americas, especially in the Amazon, and was the mentor of many other scholars who have since contributed to the discipline.

In the first half of the 20th century, Ethnobotany was a merely descriptive endeavour and ethnobotanists were merely list collectors of plant species and descriptions of their uses. However, in the last fifty years, the discipline has become more analytical and ethnobotanists are contributing to answering more theoretical questions. For example, there are studies that look at how people across cultures classify plants as a method to study human cognitive processes such as categorization and classification (Berlin, 1973).

Along with an increasing knowledge, there is a link between cultural and biological diversity on the planet, what is now referred as biocultural diversity.

Ethnobotany has also become increasingly important in applied conservation projects that take in account both social and environmental aspects, i.e. both biodiversity and people (Terralingua, 2010).

Ethnobotanists can have different trainings and use a wide array of qualitative and quantitative methods from several disciplines according to which particular area of research they focus such as Anthropology, Linguistics, Botany, Ecology, Nutrition Studies, Economics and Phytochemistry.

2.2 Importance of ethnobotany

According to information from current research (Harshberger, 1896; Prance, 1991; Given and Harris, 1994; Heinrich, 2000; Lentini, 2000; De Macvean and Pöll, 2002; Hamilton *et al*., 2003; Bletter, 2007; Lundh, 2007), ethnobotany can contribute to elucidation of cultural position of the ethnic groups who used the plants for food, shelter or clothing.

1. Elucidation of cultural position of the ethnic groups who used the plants for food, shelter or clothing.

2. Retrieval of past distribution of plants.

3. Retrieval of ancient trade routes.

4. Identification and development of new economic products from plants, for instance, crafts, foods, herbal medicines and horticultural plants and new lines of manufacture by suggesting plants with potential economic importance.

5. Assessments of the conservation status of a single plant species- including varieties of crops - and other forms of biological diversity such as plant families and forest type.

6. Sustainability in the exploitation of plant resources including non-timber forest products (NTFPs).

7. New drug development, ethnobotanical studies provide a valuable shortcut for locating biologically active compounds.

8. Enhanced food security, nutrition and healthcare scientist have found that the nutritional status of the rural poor people can be improved by native plants.

2.3 Field techniques for gathering ethnobotanical information

There are many ways to gain ethnobotanical information such as:

2.3.1 Participant observation

This technique refers to observation of human-plant interactions. Ethnobotanists may live in a community; take part in everyday activities of the local people, and share with them many facets of their lives, from subsistence activities such as cooking, farming or gathering firewood, to ritual occasion such as marriage, religious celebrations or initiation rites (Martin, 1995). The most important tools are curiosity, a willingness to learn from other people, and an ability to adapt to their rhythm and lifestyle. This method helps reduce researchers' subjectivity and intrusiveness and allows the ethnobotanists to see how people put their knowledge into practice and observe the changes that come with each season (Martin, 1995; Hoffman and Gallaher, 2007).

2.3.2 Interview

Interviewing is the most commonly used method by ethnobotanists to collect ethnobotanical data. There are many forms of interviews such as (Martin, 1995; Gerique, 2006):

2.3.2.1 Ethnobotanical inventory or field interview

This technique refers to walking in the field or in the forest with the presence of one or more informants, asking them about the use of plants and collecting the plant specimens including taking pictures of such plants. Even if this technique is considered very time-consuming, it allows informants to see the plants in their natural state, which minimizes the risk of misidentification and offers and excellent context for interview.

2.3.2.2 Plant interview

This technique refers to bringing plants collected in the field back to the village and showing them to the informants. In case that there are no fresh specimens available, pressed plant specimens or pictures of the plant can also be used in this way. The minimum data required in plant use interviews involves three deceptively simple questions: Do you know this plant? Do you know a name for this plant (and if so, what is it)? And do you use this plant (and if so, how do you use it)?

(Hoffman and Gallaher, 2007). This method is very helpful for preliminary or short studies or in order to reconfirm the collected data.

2.3.2.3 Artefact interview

This technique refers to asking the informants about all of the species associated with the manufacture or preparation of particular items; for example, plants used for making tools, baskets, etc. This technique helps familiarize the researcher with the local community. This is very helpful especially at the beginning of an ethnobotanical study.

2.3.2.4 Checklist interview

This technique refers to when ethnobotanists prepare a list of plants beforehand and show it to the informants. It is often used when time in the field is limited (Gomez-Beloz, 2002). As the plants names may vary among cultures (or sometime, individuals), to avoid the errors caused by the variation of plant names, plant pressed specimens or pictures may be used as complementary aids during the interview (Martin, 1995).

2.3.2.5 Group interview

This technique refers to when ethnobotanists conduct simultaneous interviews with several informants. The advantage of this technique is that when all informants are willing to share their knowledge in a group environment, group discussion can produce a wealth of data and lead to the discovery of new topics and questions. However, it may be that some informants are reluctant to disclose their knowledge in a group environment (Gerique, 2006).

In any form of interview, the setting of the interview and the degree to which questions are predetermined as well as the questions asked are crucial to the degree of control of the interview (Gerique, 2006). Based on the approaches of the study, qualitative or quantitative, types of interview listed below can be applied to each form of interviews described above. The open-ended and semi-structured interviews are usually used in qualitative data collection, while structured interviews and questionnaires may be used for quantitative analyses.

2.3.2.6 Open-ended interview

This kind of interview refers to the casual conversations that can reveal the detail of the interested subjects (Cotton, 1996). Questions relevant to the

subject of interest will naturally arise during the course of conversation and the researcher simply makes notes. The first open-ended interview helps researchers to develop a sense of what needs to be asked in more structured interviews (Martin, 1995).

2.3.2.7 Semi-structured interview

This type of interview is based on a checklist of topics or questions that researchers have beforehand prepared as a guide. During the conversation, some other questions may arise naturally and some of prepared questions may be omitted and fall to the wayside or left for a future discussion (Martin, 1995; Cotton, 1996).

2.3.2.8 Structured interview

Whenever quantitative data are required for analytical purposes, structured interviews are a helpful tool (Cotton, 1996). By this type of interview, a group of selected informants are requested to answer the same set of questions or to perform the same test. The interview can either be conducted by asking the questions orally or by writing it down in a questionnaire if the participants are literate. The verbatim answers yielded from this type of interview are comparative and can be analyzed using various statistical methods (Martin, 1995)

In this research project the techniques for gathering ethnobotanical information will be to interview the key informants and then to do a survey by group interview.

2.4 Ethnobotany studies in Thailand

Since 1991, Chusie Trisonthi has led the way in ethnobotanical research in Thailand, mainly focusing in the northern part of Thailand (Sriti, 2012). Later, other ethnobotanists began their own studies in the field.

Chamratpan and Homchuen (2005) found that some rural people residing in the villages of northeastern Thailand still use herbs for preventing and curing many diseases. According to the interviews from traditional healers and elders living in the seven villages in three provinces of Thailand, the medicinal plants are used in five ways: as a rubbing or poultice, a decoction, an alcoholic tincture, a massage, or eaten fresh.

Tongdonae (2001) found that regarding the indigenous knowledge, Dontong villagers have greater knowledge of plant uses than Huyyang villagers, which was higher among older women.

Inta (2008) studied ethnobotany in Pang Mapha district, Mae Hong Son Province, Northeastern Thailand. The comparative ethnobotanical study was investigated in 4 major ethnic groups (Shan, Karen, Lahu, and Lisu). A total number of 400 plant species that were used among the locals were recorded in these villages and were classified into eight categories. Plants were mainly used as food (40%) and medicine (39%) within these villages. Interesting species in this study which should be studied more in their chemical composition or product development are Elsholtzia communis, *E. stachyodes*, *E. griffithii*, *Costus speciosus*, *Dracaena tenuiflora*, *Helicteres elongata*, and *Rhus javanica*, etc.

Trisonthi (2009) recognized 258 species of the interesting plant uses, foods, and medicines. Other usages are house construction materials, household utensils, fuel wood, dyes, and fiber and clothing materials. The plants are also used in important events, ceremonies, and rituals.

Sonsupub (2010) reported the utilization of plants in 181 species, 150 genera, and 68 families. The plants were used as food (105 species 90 genera 50 families), medicine (86 species 73 genera 38 families), and miscellaneous uses such as appliances, animal feed, colorants, ceremonial purpose, *etc.* (29 species 28 genera 19 families). The older population had highly significant knowledge on plant uses than the younger generation. Knowledge on plant uses was significantly higher among women.

Sriti (2012) found that the frequently reported infectious disorders were common ailments such as fever (38.5%), ringworm (11.9%), tinea pedis (11.5%), and cold (11.1%) respectively. Despite the diversity of medicinal plants used, 28 of them were commonly used among one or more cultural groups such as *Acorus calamus*, *Ageratum conyzoides*, *Lysimachia christinae*, and *Plumbago zeylanica,* which were used to treat fever, cold, hepatitis and malaria, respectively. Of those, similar uses of 18 medicinal plants had already been reported in previous studies, suggesting real therapeutic efficacy of the plants. Therefore, scientific investigation and evaluation of effectiveness of these most used plants should be of interest for further research involving pharmacological and chemical investigations.

2.5 The General information of Nakhon Phanom Province

General information

Nakhon Phanom, once the center of the ancient Sri Kotrabun Kingdom, lies along the western bank of the majestic Mekong River, although over the centuries it has moved back and forth across the river. The setting of Nakhon Phanom is enhanced by the rugged beauty of the jungle covered mountains that lie beyond the town of Thakaek on the Laotian side of the river. King Rama I chose the name Nakhon Phanom, city of mountains, because of the remarkable mountains found in the province (Figure 2.1). Partly a result of its long history, Nakhon Phanom is a melting pot of diverse ethnic cultures and traditions, particularly represented by the Lao, who have lent a strong influence on the architecture, customs, and cuisine of Nakhon Phanom, including the Bai-Sri-Su-Kwan welcoming ceremony. Covered with both high hills and low lying, forest covered plains, Nakhon Phanom is the site of Phra That Phanom, the most ancient and sacred religious monument in Northeastern Thailand. Thais and Laotians are both common pilgrims to this highly venerated Buddhist shrine where they come to ask for blessings.

Throughout the history of Nakhon Phanom, Laotians and people from smaller ethnic minority groups migrated across the Mekong River giving modern Nakhon Phanom a distinctive cultural fusion that is apparent in the local language, customs, and cuisine. Visitors can appreciate this culture during the Bai-Sri-Su-Kwan ceremony or by witnessing one of the region's folk dances, such as the Sri Kotrabun, Fon Phu Thai, Sak-Ten-Sark, and So Tung Bung, some of which are only performed on special occasions.

Figure 2.1 The location of Nakhon Phanom province
(Nakhon Phanom culture office, 2014)

2.6 The Ethnic Groups in Nakhon Phanom

Nakhon Phanom has a long historical background of over a thousand years, like other ancient well developed communities in Sakhon Nakhon Basin, and is situated near the great river basin of the Songkhram River and the Mekong River. King Rama III appointed Phra Sunthornwongsa to govern Muang Nakhon Phanom and Muang Yasothorn. The Viceroy moved these troops to relocate the people to the left-side of the Mekong River bank from Laos. Tribes, which consisted of Phuthai, Kha, Kra So or Tai So, Kalerng, Saek, Yaw, and Yoei, were relocated from Muang Wang, Muang Pin, Muang Nong, Muang Se-Pone, Muang Kham Kerd, Muang Kham Moeun, Muang Kham Or Kham Khiao, Muang Saek, Muang Chiang Hom, Muang Pha Bung, and others. The people were forcibly resettled by the government. From the above historical evidence, Nakhon Phanom consists of various peoples. (Juladalai *et al*., 2006).

In Nakhon Phanom there are seven ethic groups; Phu Thai, Kaleung, So, Sak, Yaw, Kha and Thai I-San. (Figure 2.2)

Figure 2.2 The seven ethnic groups in Nakhon Phanom**,** from left to right Phu Thai, Yaw, Kaleung, Sak, researcher, So, Kha, and Thai I-San.

2.6.1 Phu Thai

Phu Thai is considered to be one of the many Thai-Laos race groups in Asia. They were originally from the district of 12 juthai, but migrated to northeastern Thailand during 1844-1878. Prominently, most of Phu Thai people have been in the area of Karasin, Sakhon Nakhon, Nakhon Phanom, Mukdahan Aumnajalearn, Yasothorn, Roi-et, Ubonratchathani, Udonthani, and Nong Khai ever since the migration period. (Kayormdock, 2007)

Renu Nakhon is home to the Phu Thai ethnic group where they strongly preserve their traditions such as welcoming guests with a ‘Bai Si’ ceremony, a ‘Pha Laeng’ typical dinner party, with ‘U’ local liquor, and with the traditional ‘Phu Thai’ dance.

In the past, the Phu Thai believed that upon death, ones relatives become ghosts or spirits who take care of the living relatives. When children do something wrong, they have to determine if a ghost was the cause of it. The Phu Thai people

are Buddhists influenced by Laos, therefore, Phu Thai make merit and also believe in spirits. The Phu Thai follow “Hit Sib Song Krong Sib Sie” local traditions which are organized in the third or fourth month (the time for each village may be different). Mor Yao (Shaman) can be men or women who are intermediaries between the ghosts and humans by using La (Speaking) along the flute and Lao reed mouth-organ. For the sick, the Mor Yao investigates which ghost caused the patients sickness and provides what needs to be done for the cure. There are many ceremonies “Yao”, such as the “common -Yao”. To help the sick, the “Fulfill one’s vow-Yao” is performed by the Mor Yao through a ceremony of showing respect. The Ceremony of Mor - Yao is still practiced in its traditional manner today.

Phu Thai has art and cultural conservation activities, such as the Phu Thai Dances, which are a traditional art of this ethnic group. Handed down from generation to generation, the dance mirrors harmony among the Phu Thai people. The cheerful dance is quite popular for the festive celebrations in the 5th and 6th lunar months, which are held along with the local rocket festival and annual celebration of Phrathat Renu. Formerly, the Phu Thai dance did not have a particular pattern. Mostly, men grouped up to show off to ladies. Presently, both men and women perform this traditional dance as couples.

Figure 2.3 Phu Thai ethnic group

2.6.2 Kaleung

Kaleung is a minority language group similar to Yaw, So, Sak, Phu Thai, and Vietnamese, which are located in Nakhon Phanom province. Kaleung originated on the western side of the Mekong. Kaleung migrated to Thailand about 100 years ago when The King Rama III subdued the Chao Anuvong and during the King Rama V "Hor Rebel Fighting" in the year 1873. Presently, there are Kaleung in Kalasin, Mukdahan, and Nakhon Phanom province. In Nakhon Phanom, there are Kaleung that live in every district, particularly in Tha Uthen, Na Kae, That Phanom, and Plapak.

The tradition of Kaleung in Guruku is to prepare great merit called Vessantara Jataka (Sermon), which is held in three year intervals. It is extremely costly and also has a tradition of spirit which is organized every year.

During birth, the doctor (midwife) will cut the umbilical cord with a sharp piece of bamboo. The mother will live under the interdiction between 7 to 21 days with the mother and child lying on a bamboo mat. One elbow must be beside the carriage with 2 bonfires; one boiling water for bath and one to boil herbal medicine for health(core redwood, roots, and leaves of Thungtoon tree).Then the mother will drink 3-4 pots of the herbal medicine.(Dumrongkul, 2003).

When someone becomes ill and incurable, a doctor must help. They are called "Yao". The doctor will invite a ghost or spirit and then ask them how to treat the patient. If the patient is ill because of the ghost, doctors will mediate between the spirit and patient. The types of doctors are: 1. Doctors of ghost (shamon), who the ghost speaks through the devil, we call "Pee Fah" or "Pee Tan"; 2. Doctor of ghost (shamon) who had studied this way called "Pee Mor" or "Pee Toi" has 4 types below;

"Normal Yao" to recover from a fever.

"Yao" for exorcise.

"Yao" for cultivation.

"Yao" for a new house

Currently among Kaleung, no specific actions to directly preserve the tradition have been taken. However, these traditions are used in events and take action in "Hit Sib Song Krong Sib Sie" of I-san people. (Arunpipattanapong, 2011)

Figure 2.4 Kaleung ethnic group

2.6.3 Sak

The Sak are another group of minorities of the several ethnic groups in northeast Thailand. The original Sak had settled in Rong City and Vea City on the border of Vietnam and China. Sak has the industry median sacred endeavor. Cultural unity is shown when a house is no longer livable and the community helps move them to a new address. They migrated along the Khong river and temporally setting between Vietnam and Laos by Tao kaisu and Tao Kaicha.

The Sak moved to Phai Lom (Atsamat) Ban Dong Sa Mor, Ban Bawa (Na Wa district) in Srisongkram area, Nakhon Phanom, and Pho Kha (Laos). Most of the Sak descendants and relatives of the Sak are in Atsamat. There are some Sak people in “Xishuangbanna”, China and Samutsongkram, Thailand.

Sak in Atsamat are natives who call themselves Sak, a language in the Tai language family. Sak only has a spoken language and do not have a script for writing. Although the Sak villages and groups are spread in different countries, they all speak the same language.

Bha is at ritual vowing to Ong Moo (the spirit of Sak) and respecting the god when trouble comes. Bha will be organized when someone gets sick or something

is missing and want to fix the problem. Objects and items used in the Bha ritual such as raw betel nut, betel leaves, betel leaves with lime, candles, flowers and unlimited amount of joss stick but only 4 incense for lighting.

There are many projects and activities related to the conservation of indigenous culture. In the Let-Dinh ceremony, Sak believes that this ritual has a role in faith, feeling good, feeling united by the blood of the same ethnic group, creating awareness of Sak traditions of birth, harmony, and to respect ancestors. (Arunpipattanapong, 2011)

The 'Pestle Dance" belongs to the Sak ethnic group in At Samat Village. The dance is performed annually on the 3rd day of the waxing moon of the 3rd lunar month to please the spirit. If the dance is to be performed in another period, the spiritual leader will have to ask for permission by offering a pig's head, 20-baht cash, and liquor, then pick up a predictive colored stick. If the leader picks up a stick of the same color, that means the spirit does not allow. The dancers will perform to the fast rhythm of drums and striking pestles painted in red and white.

Figure 2.5 Sak ethnic group

2.6.4 So

So or Kra-So in Nakhon Phanom is the same ethnic group as Bru or Kha. Anthropologist classified So as a member of the Mongoloid group. They have a different language and customs from Kha. Their language is in the Austro-Asiatic Language Family Group. Some information on Thai ethnic languages comes from the Language and Cultural Research Institute for Rural Development at Mahidol University, which described So.

According to the information, So immigrated to Thailand during King Rama III's reign. The tribe resettled in Muang Ramaraj, which was Muang Nakhon Phanom's satellite. In B.E.2387, the king appointed Thao Bua of Muang Chieng Hom as Phra Thai Pratet, the first governor. The area, which is So's community, is now Ramaraj Sub-district, Phra Tai Subdistrict, Tha Champa Sub-district of Tha U-tane District and Phone Sawan Sub-district, Ban Khor Sub-district, Na Kamin Sub-district of Phone Sawan District in Nakhon Phanom.

Lots of So people live at Phone Sawan District in Nakhon Phanom and Kusumal District in Sakon Nakhon. So's communities at Phone Sawan District wholeheartedly conserve their culture. They believe in supernatural powers such as Phi Fa, Phraya Thaen and worship former ancestors which represent Phi Pu Ta. Their distinguished traditional wisdom is their handicraft textiles such as Pha Mud Mee Yom Kram, Pha Keb, and cloth for Teen Sin. The textiles are unique to So. The cloth which has meticulous, colorful, floral patterns was woven by Taiso's spirit under supernatural powers, Phi Fa. Mostly the weaving is homemade cloth. They make cloth for their uses. So weaving traditional wisdom transfers mostly among family members and relatives (Juladalai *et al*., 2006).

Thai So has formed their own traditions and culture of the dance "So Tung Bung" Dance or "So Kra Tong kra boke Mai Pai" ceremony was held specifically to treat illnesses or show gratitude to ancestors.

"So Tung Bung" treats illnesses. The ceremony begins with an interpreter to invite ghosts of an old female and is asked about the cause of the illness.
The translator will instruct how to treat the patient to recovery. Sometimes the patient will get up and dance, So Tung Bung" Dance, which means the patients are healed or healthy.

“So Tung Bung” is also performed for taking "care of one’s spirit”. It is a ritual similar to the dance for treating the sick. Patients can dance to ask for travel or if they want to know about farming. They dance around with wooden elephants and horses. They will dance holding hoes and spades with music using the Lao reed mouth organ for drums. This ceremony is called “So Tung Bung” dancing (Arunpipattanapong, 2011).

Sang-Sa-Nam ritual is performed to show gratitude for parents or the kindness of others. As a tribute to “The Phantom's Ghost Ranch” for farming, the ritual is performed between the 4th and 5th month. The ritual is similar to “Yao” ceremony when a family member is sick. The homeowner invites the “Mae Keaw” and ancestral spirits or ghosts, depending on whether he possessed any spirit or God. When they come to the interpreter, the doctor will ask what they want and where they come from. They will beat a wooden drum while performing the ritual. The patient is cured, depending on the satisfaction of evil spirit. The family dances strangely when finished. The doctor will start to throw eggs or toss the sword by prayers when the prayers end. She sprinkles holy water to bless the receiver with a fortune.

Figure 2.6 So ethnic group

2.6.5 Yaw

The Thai Yaw originated from Hong Sa, Chaiburi of Laos or Lan Chang of Thailand. Thai Yaw mostly immigrated and settled in Pak Nam Songkram near the Mekong River (currently in Chaiburi District, Tha Uthen, Nakhon Phanom), during the reign of the First King Rama in 1808. During the reign of the third King Rama (year 1826), the Yaw in Chaiburi were forcibly moved to Pu Ling town on the west bank of the Mekong River. They returned to the east bannk of the Mekong River and became Tha Uthen in the 1830's. Most of the Yaw people live in Chai Buri village, Tha Uthen, and Nakhon Phanom.

The Flower Parade during Songkran (water festival), highlights unique Yaw tradition. The parade is held in the evening after people get back from work. The flowers (Plumeria being the most popular) are located in the north part of Wat Phra That Tha Uthen. The parade includes Yaw Dance as well.

Yaw dancing is performed during Songkran (water festival) where people pour water on each other during the day. The parade starts in the north and continues to the south of the village. Celebrations occur between the 7^{th} and 15^{th}, waxing moon day of the 5^{th} month.

All night, the young people bring flowers (Plumeria) called Dok Champa. The dancing parade worships at all temples except the northern temple. After the last day of the parade the young men and women celebrate by dancing.

The Yaw people have similar traditions to Laos. Hit Sib Song (such as general I-san people) is the wedding of Yaw, where the daughter-in-law goes back home called Pai Soo. If the son-in-law move back home it is called Ma Soo. In the past, the Yaw preferred to marry in the same group. They believed that their clan was better than other nations and were afraid of losing their status (Arunpipattanapong, 2011).

Figure 2.7 Yaw ethnic group

2.6.6 Kha

Kha is a small group of people who still live in Nakhon Phanom. Some reside in Na Kae district and also around the Phu Phan Mountains, which are connected the Dong Luang, Mukdahan Province. There are many Kha people in Dong Luang. In the past, Dong Luang was a part of Nakhon Phanom, however, currently the Kha does not appear prominently in Nakhom Phanom. There are only a few scattered families in the communities mentioned above. Kha originated from Savannakhet, Salawan, and Attapeu of Lao PDR, and they migrated to Thailand during the reign of the third King Rama. Most of the Kha people live in Sok Mew village, Um Mao, Thatphanom, and Nakhon Phanom. The Kha language is of the Austro Asiatic family along with Mon-Khmer. Kha is divided into several groups such as Kha Ya hin, Kha Sukha Ta oy, Kha Sok, and Kha Sapoan, etc.

The Kha people do not call themselves Kha. They prefer to be called Bru, which means mountain. The word Kha in I-san language has the same meaning as Bru. However, in the Kha language, Kha means Katat or slave (Arunpipattanapong, 2011).

In the past, Thai who lived along the Mekong River liked to catch Kha (Bru) in the forests as slaves. During the reign of King Rama VI, it was prohibited to catch them as slaves.

The marriage ceremony consists of 4 matchmakers (2 males, 2 females) with 4 candles and 5 baht silvers. When the wedding begins they need to have 2 jars of Lao Uh (Rice Wine), 2 chickens, 8 eggs, 2 baht silver, 1 pig, and 1 pair of silver bracelets. There are some who are against traditional (fornication), as they don't let the wife go to the bedroom before the husband. They do not let the daughter-in-law get anything from her father, they don't let the son-in-law leave the house, and they and don't let the son-in-law carry a knife or a hat into the house. The penalty required is a 5 baht silvers, and a pig. This law requires the 5 baht, pig, 2 pairs of flowers and candles, 2 traditional cigarettes, with 2 of betel leafs, and the items are used to respect the ghosts (souls) at the east corner of the house or fireplace. The daughter uses a cloth, one piece of fabric, 2 flowers and candles, 2 betel leaves, 2 tobacco cigarettes to do the same ceremony (Arunpipattanapong, 2011).

Figure 2.8 Kha ethnic group

2.6.7 Thai I-san

Thai I-san is the largest ethnic and language group in Northeast, Thailand and the Mekong River area. The Thai I-san language is spoken in Laos. Perhaps, people who spoke Thai I-san in the northeast of Thailand may have more in common with people who speak Lao. Groups of Thai I-san or I-san people have settled in the Northeast also called I-san. I-san means Northeastern. The northeast of Thailand

included various nationalities such as Laotian, Cambodian, Thai, Chinese, Vietnamese, and Indian. Laos people are the largest percentage of the population in the Northeast. Royal court called this area “the districts”. In the Eastern districts of Laos, until the year 1933, the area had been under the control of other countries in the Northeast and has been designated as the East Region (I-san) to the present. Most of the Thai I-san people in Nakhon Phanom live in Tambon Phra That Phanom, Nakhon Phanom (Arunpipattanapong, 2011).

Thai I-san have their own spoken language, but no written language. It is classified under the Tai Kadai language family (Tai - Kadai). Due to vast underdeveloped land, adequate health care has not been possible. Thai I-san people believe in ghosts of their grandparents, ghosts of the forest, ghosts of the mountains, etc. They still believe in ghosts today and is difficult to change their beliefs. They have a belief that if they do a good thing, it will lead to an identity of good merit, Hit Sib Song Krong Sib Sie (Arunpipattanapong, 2011).

Figure 2.9 Thai I-San ethnic group

CHAPTER 3

MATERIALS AND METHODS

3.1 Study sites

The ethnic groups in Nakhon Phanom that will be selected as study sites for collecting the ethnobotanical data and representative ethnobotanical plants of target ethnic groups are: Kaleung, Kha, Phu Thai, Sak, So, Thai I-San, and Yaw in Nakhon Phanom province (Figure 3.1).

Figure 3.1 The study site Maps of world. (2012)

3.2 Materials

3.2.1 Materials for ethnobotanical field survey

3.2.1.1 Materials for recording geographical data, taking photographs, and interviewing are an altimeter, a camera, note books, and questionnaires.

3.2.1.2 Materials for collecting representative ethnobotanical specimens are cutting tools, paper labels with string, permanent markers, plastic bags, and a digital vernier caliper.

3.2.2 Materials for the identifying of ethnobotanical specimens

3.2.2.1 Petri dish

3.2.2.2 Razors

3.2.2.3 Stereo microscope

3.2.2.4 Ruler

3.2.3 Materials for the preparing of herbarium specimens

3.2.3.1 Adsorbent papers

3.2.3.2 Corrugated cardboard

3.2.3.3 Glue

3.2.3.4 Hot air oven

3.2.3.5 Mounting papers

3.2.3.6 Needles

3.2.3.7 Newspapers

3.2.3.8 Paper labels

3.2.3.9 Plant press

3.2.3.10 Threads

3.2.3.11 White paper covers

3.3 Methods

A study of ethnobotany of the ethnic groups in Nakhon Phanom Province was conducted between January 2015 and December 2015. Twelve districts in Nakhon Phanom Province were surveyed. Traditional healers and elder persons were interviewed and accompanied to the forests. The interviews were about the local names, uses of the plants, which parts of plants were used and how they were used. Patients

were also interviewed in some cases. Photographs of plants were taken and the morphology of each plant was characterized. Finally, the scientific names were identified according to Smitinand (2014).

3.3.1 Ethnobotanical field survey

Ethnobotanical specimens and data were collected in 7 ethnic groups in Nakhon Phanom province between 2015 and 2016. The duration of this ethnobotanical field survey in each village was one year and the frequency of data collection was once a month. Ethnobotany data was collected by interviewing informants such as leaders, folk healers, matriarchs, witch doctors, and villagers. The interview techniques used were the open-ended interview, semi-structured interview, questionnaire and group interview. They were asked about the information of useful plants as follows:

1. Local name
2. Plant parts used
3. Mode of preparation (decoction, hot infusion, pounded, etc.)
4. Routes of administration (bath, poultices, teas, etc.)

The information of useful plants was documented and these useful plants were photographed. The representative ethnobotanical plants were collected for the preparation of herbarium voucher specimens. The survey was performed several times and stopped when no more useful plants appeared or a number of useful plants were repeatedly found.

3.3.2 Identification of collected ethnobotanical specimens

The collected representative ethnobotanical specimens were identified to know the plant species and scientific name using taxonomic literature such as: “Plant Identification Guide” (Chayamarit, 1998) and “Plant Systematic a phylogenetic approach” (Judd, 2002). The accuracy of plant identification was confirmed by comparison to herbarium voucher specimens from reference herbaria such as Bangkok Herbarium (BK), and Forest Herbarium (BKF).

3.3.3 Preparation of herbarium specimens

It is necessary to collect representative ethnobotanical specimens as herbarium specimens because they provide long-term scientific record of a used plant (Giovannini, 2011). Herbarium specimens were prepared following Thai plant names presented by Smitinand (2014). Firstly, the representative ethnobotanical specimens were dried by lying inside folded newspaper sheets. Then, adsorbent papers were placed on both sides of each folded newspaper and corrugated cardboard was placed on each side of the adsorbent papers. Next, the representative ethnobotanical specimens were pressed using a plant press. The plant press was put in a hot air condition (temp & time). After drying, the representative ethnobotanical specimens were mounted on special paper by sewing or using glue or special tape. Labels were attached to the herbarium sheets with the date and site of collection, the name of the collector, the species and the botanical family of specimen and the name of the person who determined the species. All of herbarium specimens used in this study were deposited at the Herbarium of Mahasarakham University (MSU).

3.3.4 Data analysis

3.3.4.1 To study plants diversity which are used by the ethnic groups in Nakhon Phanom.

Frequency, mean, standard deviation, and percentage were used to analyze plants diversity.

The cultural importance index (CI) (Tardío and Santayana, 2007) was used to estimate the significance of each species. This index is widely used in ethnobotanical studies to determine diversity of uses and the consensus of informants. The index is defined as:

$$CI = \sum_{U=1}^{NC} \sum_{i=1}^{N} \frac{UR_{ui}}{N}$$

where UR is the total number of use reports for each use category of a given species, N is the total number of informants, and NC is the total number of use categories. Therefore, the CI is the sum of the proportion of informants that mention each of the use categories for a given species. This additive index takes into account not only the spread

of the use (number of informants) for each species, but also its versatility, i.e., the diversity of its uses. Another important property of the CI index is that each addend is a measure of the relative importance of each plant use (Tardío and Santayana, 2007).

3.3.4.1.2 To study the relationship between gender, age, and indigenous knowledge of the ethnic groups, data was analyzed by using the statistical program SPSS 11.5 for windows (independent-samples t-test and one way ANOVA).

3.3.4.3 To do a comparative study on the ethnobotany of the ethnic groups.

To compare species composition of plants used between villages and investigate whether plants used by all ethnic groups studied are similar, the clustering technique and UPGMA cluster analysis were applied to the entire set of plant uses by all villages. The UPGMA cluster analyses were performed using the NTSYS program (version 2.20e) (Rohlf, 2000), based on data matrices and Jaccard's index of similarity, the index is expressed as:

$$JSI = C / A + B - C$$

where A is the number of species unique to area A, B is the number of species unique to area B, and C is the number of species found in both areas. (Srithi, 2012).

CHAPTER 4

RESULTS

4.1 Diversity of plants

4.1.1 Family and plant species.

Data was collected from two hundred and ninety-two informants from seven ethnic groups in Nakhon Phanom province**.** There were three hundred and fifty-eight plant species in ninety-three families that the ethnic groups used in their daily lives. The largest number of plants species came from Fabaceae with forty-five species (12.57 %), followed by Zingiberaceae with twenty-one species (5.87%), and Poaceae with fifteen species (4.19 %) (Table 4.1).

Table 4.1 Species of plant and percentage per family.

No.	Family	Species	Percentage
1	Fabaceae	45	12.57
2	Zingiberaceae	21	5.87
3	Poaceae	15	4.19
4	Apocynaceae	14	3.91
5	Malvaceae	11	3.07
6	Rubiaceae	10	2.79
7	Asteraceae	9	2.51
8	Cucurbitaceae	9	2.51
9	Lamiaceae	9	2.51
10	Solanaceae	9	2.51
11	Phyllanthaceae	8	2.23
12	Acanthaceae	7	1.96
13	Annonaceae	7	1.96
14	Araceae	7	1.96
15	Dipterocarpaceae	7	1.96
16	Apiaceae	6	1.68
17	Moraceae	6	1.68
18	Rutaceae	6	1.68

Table 4.1 Species of plant and percentage per family (continued).

No.	Family	Species	Percentage
19	Amaranthaceae	5	1.40
20	Arecaceae	5	1.40
21	Bignoniaceae	5	1.40
22	Combretaceae	5	1.40
23	Convolvulaceae	5	1.40
24	Ebenaceae	5	1.40
25	Euphorbiaceae	5	1.40
26	Myrtaceae	5	1.40
27	Piperaceae	5	1.40
28	Amaryllidaceae	4	1.12
29	Anacardiaceae	4	1.12
30	Dioscoreaceae	4	1.12
31	Lythraceae	4	1.12
32	Musaceae	4	1.12
33	Rhamnaceae	4	1.12
34	Cyperaceae	3	0.84
35	Menispermaceae	3	0.84
36	Salicaceae	3	0.84
37	Sapindaceae	3	0.84
38	Sapotaceae	3	0.84
39	Brassicaceae	2	0.56
40	Clusiaceae	2	0.56
41	Hypericaceae	2	0.56
42	Lauraceae	2	0.56
43	Lecythidaceae	2	0.56
44	Marantaceae	2	0.56
45	Meliaceae	2	0.56
46	Molluginaceae	2	0.56
47	Oleaceae	2	0.56
48	Oxalidaceae	2	0.56
49	Pandanaceae	2	0.56

Table 4.1 Species of plant and percentage per family (continued).

No.	Family	Species	Percentage
50	Polypodiaceae	2	0.56
51	Vitaceae	2	0.56
52	Alismataceae	1	0.28
53	Basellaceae	1	0.28
54	Bromeliaceae	1	0.28
55	Burseraceae	1	0.28
56	Capparidaceae	1	0.28
57	Caricaceae	1	0.28
58	Celastraceae	1	0.28
59	Chrysobalanaceae	1	0.28
60	Cleomaceae	1	0.28
61	Connaraceae	1	0.28
62	Costaceae	1	0.28
63	Dilleniaceae	1	0.28
64	Elaeocarpaceae	1	0.28
65	Fagaceae	1	0.28
66	Gentianaceae	1	0.28
67	Gnetaceae	1	0.28
68	Irvingiaceae	1	0.28
69	Loganiaceae	1	0.28
70	Loranthaceae	1	0.28
71	Marsileaceae	1	0.28
72	Melastomataceae	1	0.28
73	Moringaceae	1	0.28
74	Mulpighiaceae	1	0.28
75	Muntingiaceae	1	0.28
76	Nelumbonaceae	1	0.28
77	Nymphaeaceae	1	0.28
78	Opiliaceae	1	0.28
79	Orchidaceae	1	0.28
80	Passifloraceae	1	0.28

Table 4.1 Species of plant and percentage per family (continued).

No.	Family	Species	Percentage
81	Pedaliaceae	1	0.28
82	Polygonaceae	1	0.28
83	Primulaceae	1	0.28
84	Rhizophoraceae	1	0.28
85	Santalaceae	1	0.28
86	Saururaceae	1	0.28
87	Scorphulariaceae	1	0.28
88	Simaroubaceae	1	0.28
89	Smilacaceae	1	0.28
90	Styracaceae	1	0.28
91	Symplocaceae	1	0.28
92	Xanthorrhoeaceae	1	0.28
93	Xyridaceae	1	0.28
	Total	358	

4.1.2 Cultural importance index (CI)

Table 4.2 Cultural importance index (CI) of the ten most important plant species in the seven ethnic groups.

No.	Species	CI
1	*Musa balbisiana* Colla	2.678
2	*Musa* × *paradisiaca* L.	2.637
3	*Oryza sativa* L.	2.603
4	*Cocos nucifera* L.	2.572
5	*Artocarpus heterophyllus* Lam.	2.295
6	*Bambusa nutans* Wall. ex Munro	2.038
7	*Senna siamea* (Lam.) H. S. Irwin & Barneby	2.000
8	*Saccharum officinarum* L.	1.979
9	*Xylia xylocarpa* (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen	1.949
10	*Tamarindus indica* L.	1.901

Table 4.2 shows that *Musa balbisiana* Colla had the highest CI (CI = 2.678), followed by *Musa* × *paradisiaca* L. (CI = 2.637), and *Oryza sativa* L. (CI = 2.603). The seven ethnic groups have distinct traditions, but the culture is similar. They also believe in ghosts and spirits. They did the merits and rituals each month of the year. At their rituals and celebrations, rice was the main food staple but bananas were widely used as well (*Musa balbisiana* Colla and *Musa* × *paradisiaca* L.) For example, Bai si ceremony, making a ceremonial Yao, for weddings, house warming, or ritual and belief in each ethnic group. The bananas were used as food, medicine, and sometimes for making rope.

Table 4.3 Cultural importance index (CI) of the ten most important plant species in the Phu Thai.

No.	Species	CI
1	*Oryza sativa* L.	2.745
2	*Saccharum officinarum* L.	2.638
3	*Cocos nucifera* L.	2.574
4	*Musa* × *paradisiaca* L.	2.553
5	*Musa balbisiana* Colla	2.553
6	*Artocarpus heterophyllus* Lam.	2.149
7	*Phyllanthus acidus* (L.) Skeels	2.021
8	*Nelumbo nucifera* Gaertn.	2.000
9	*Punica granatum* L. var. *granatum*	1.979
10	*Bambusa nutans* Wall. ex Munro	1.872

Table 4.3 shows that *Oryza sativa* L. had the highest CI (CI = 2.745), followed by *Saccharum officinarum* L. (CI = 2.638), and *Cocos nucifera* L. (CI = 2.574).

The Phu Thai ethnic group had their own culture and traditions. There is also belief in ghosts and spirits as well. They had brought the plants to take advantage of living such as food, medicine, rituals, and other uses. Rice is the main food of the Phu Thai. Sugarcane (*Saccharum officinarum* L.) and coconut (*Cocos nucifera* L.) were used for food, used as a medicine, and was also used in rituals.

Table 4.4 Cultural importance index (CI) of the ten most important plant species in the So.

No.	Species	CI
1	*Musa* × *paradisiaca* L.	2.929
2	*Musa balbisiana* Colla	2.857
3	*Cocos nucifera* L.	2.810
4	*Xylia xylocarpa* (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen	2.667
5	*Oryza sativa* L.	2.571
6	*Alpinia galanga* (L.) Willd.	2.429
7	*Artocarpus heterophyllus* Lam.	2.429
8	*Dioscorea hispida* Dennst.	2.381
9	*Phyllanthus emblica* L.	2.381
10	*Oroxylum indicum* (L.) Benth. ex Kurz	2.333

Table 4.4 shows that *Musa* × *paradisiaca* L. had the highest CI (CI = 2.929), followed by *Musa balbisiana* Colla (CI = 2.857), and *Cocos nucifera* L. (CI = 2.810). So had their own culture, language, dress, customs, health care, and the belief in ghosts and spirits. The reason that bananas and coconuts had the highest CI is because these plants had many uses, such as food, medicine, rituals, and other benefits.

Table 4.5 Cultural importance index (CI) of the ten most important plant species in the Sak.

No.	Species	CI
1	*Musa* × *paradisiaca* L.	2.829
2	*Artocarpus heterophyllus* Lam.	2.805
3	*Cocos nucifera* L.	2.756
4	*Musa balbisiana* Colla	2.756
5	*Oryza sativa* L.	2.585
6	*Xylia xylocarpa* (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen	2.585
7	*Senna siamea* (Lam.) H. S. Irwin & Barneby	2.537
8	*Allium sativum* L.	2.488
9	*Alpinia galanga* (L.) Willd.	2.439
10	*Dioscorea hispida* Dennst.	2.415

Table 4.5 shows that *Musa* × *paradisiaca* L. had the highest CI (CI = 2.829), followed *Artocarpus heterophyllus* Lam. (CI = 2.805), and *Cocos nucifera* L. (CI = 2.756). Sak has indigenous cultures that have valued traditions such as "Sak Ten Sak" and the use of such plants in existence. Bananas (*Musa* × *paradisiaca* L., *Musa balbisiana* Colla), jackfruits (*Artocarpus heterophyllus* Lam.), coconuts (*Cocos nucifera* L.), and rice (*Oryza sativa* L.) were the most important plants which were used by Sak. These plants are beneficial to the daily life of the Sak because they are used as food, medicine, rituals, and other uses.

Table 4.6 Cultural importance index (CI) of the ten most important plant species in the Kaleung.

No.	Species	CI
1	*Oryza sativa* L.	2.875
2	*Musa balbisiana* Colla	2.775
3	*Cocos nucifera* L.	2.675
4	*Musa* × *paradisiaca* L.	2.525
5	*Artocarpus heterophyllus* Lam.	2.3
6	*Terminalia chebula* Retz. var. *chebula*	2.25
7	*Saccharum officinarum* L.	2.1
8	*Senna siamea* (Lam.) H. S. Irwin & Barneby	2.025
9	*Morinda citrifolia* L.	1.975
10	*Pandanus amaryllifolius* Roxb.	1.975

Table 4.6 shows that *Oryza sativa* L. had the highest CI (CI = 2.875), followed by *Musa balbisiana* Colla (CI = 2.775), and *Cocos nucifera* L. (CI = 2.675). The reason that rice *(Oryza sativa* L.), bananas (*Musa balbisiana* Colla), and coconuts (*Cocos nucifera* L.) were the highest CI in Kaleung ethnic group is because these plants are used in their daily lives, such as for food, medicine, cultural, and other uses.

Table 4.7 Cultural importance index (CI) of the ten most important plant species in the Yaw.

No.	Species	CI
1	*Musa balbisiana* Colla	2.523
2	*Musa* × *paradisiaca* L.	2.295
3	*Cocos nucifera* L.	2.273
4	*Oryza sativa* L.	2.227
5	*Artocarpus heterophyllus* Lam.	1.955
6	*Dioscorea hispida* Dennst.	1.955
7	*Cratoxylum formosum* (Jacq.) Benth. & Hook. f. ex Dyer subsp. *pruniflorum* (Kurz) Gogelein	1.886
8	*Pandanus amaryllifolius* Roxb.	1.818
9	*Saccharum officinarum* L.	1.773
10	*Bambusa nutans* Wall. ex Munro	1.750

Table 4.7 shows that *Musa balbisiana* Colla had the highest CI (CI = 2.523), followed by *Musa* × *paradisiaca* L. (CI = 2.295), and *Cocos nucifera* L. (CI = 2.273). The reason that rice *(Oryza sativa* L.), bananas (*Musa balbisiana* Colla), and coconut (*Cocos nucifera* L.) were the highest CI in Kaleung ethnic group is because these plants are used in their daily lives for food, medicine, cultural, and other uses.

Table 4.8 Cultural importance index (CI) of the ten most important plant species in the Kha.

No.	Species	CI
1	*Oryza sativa* L.	2.906
2	*Cocos nucifera* L.	2.719
3	*Musa* × *paradisiaca* L.	2.719
4	*Dioscorea hispida* Dennst.	2.688
5	*Musa balbisiana* Colla	2.656
6	*Artocarpus heterophyllus* Lam.	2.188
7	*Pandanus amaryllifolius* Roxb.	2.094
8	*Bambusa nutans* Wall. ex Munro	2.000
9	*Tamarindus indica* L.	1.969
10	*Senna siamea* (Lam.) H. S. Irwin & Barneby	1.875

Table 4.8 shows that *Oryza sativa* L. had the highest CI (CI = 2.906), followed by *Cocos nucifera* L. and *Musa* × *paradisiaca* L. (CI = 2.719 each), and *Dioscorea hispida* Dennst. (CI = 2.688).Kha is a small ethnic group living in That Phanom district, a priceless cultural heritage that have their own specific language. The reason that rice *(Oryza sativa* L.), coconut (*Cocos nucifera* L.), and bananas (*Musa balbisiana* Colla) were the highest CI in Kha ethnic group is because these plants are used in their daily lives of them as food, medicine, cultural, and other uses.

Table 4.9 Cultural importance index (CI) of the ten most important plant species in the Thai I- san.(Continued)

No.	Species	CI
1	*Musa* × *paradisiaca* L.	2.652
2	*Musa balbisiana* Colla	2.652
3	*Oryza sativa* L.	2.413
4	*Cocos nucifera* L.	2.283
5	*Artocarpus heterophyllus* Lam.	2.261
6	*Bambusa nutans* Wall. ex Munro	2.196
7	*Saccharum officinarum* L.	1.913
8	*Tamarindus indica* L.	1.804
9	*Cratoxylum formosum* (Jacq.) Benth. & Hook. f. ex Dyer subsp. *pruniflorum* (Kurz) Gogelein	1.761
10	*Pandanus amaryllifolius* Roxb.	1.739

Table 4.9 shows that *Musa* × *paradisiaca* L and *Musa balbisiana* Colla had the highest CI (CI = 2.652 each), followed by *Oryza sativa* L. (CI = 2.413), and *Cocos nucifera* L. (CI = 2.283). Thai I- san have their own culture, language, dress, customs, health care, the belief in ghosts and spirits. They commonly live in That Phanom district. They use bananas (*Musa balbisiana* Colla and *Musa* × *paradisiaca* L.) in Bai si ceremony, making a ceremonial Yau, for weddings, house warming or for other rituals and beliefs. In other ways, bananas were also used as a food, a medicine, and for making rope. In addition, rice is an important crop that is the main food staple.

4.1.3 Plant part used, plants habit, and plants source

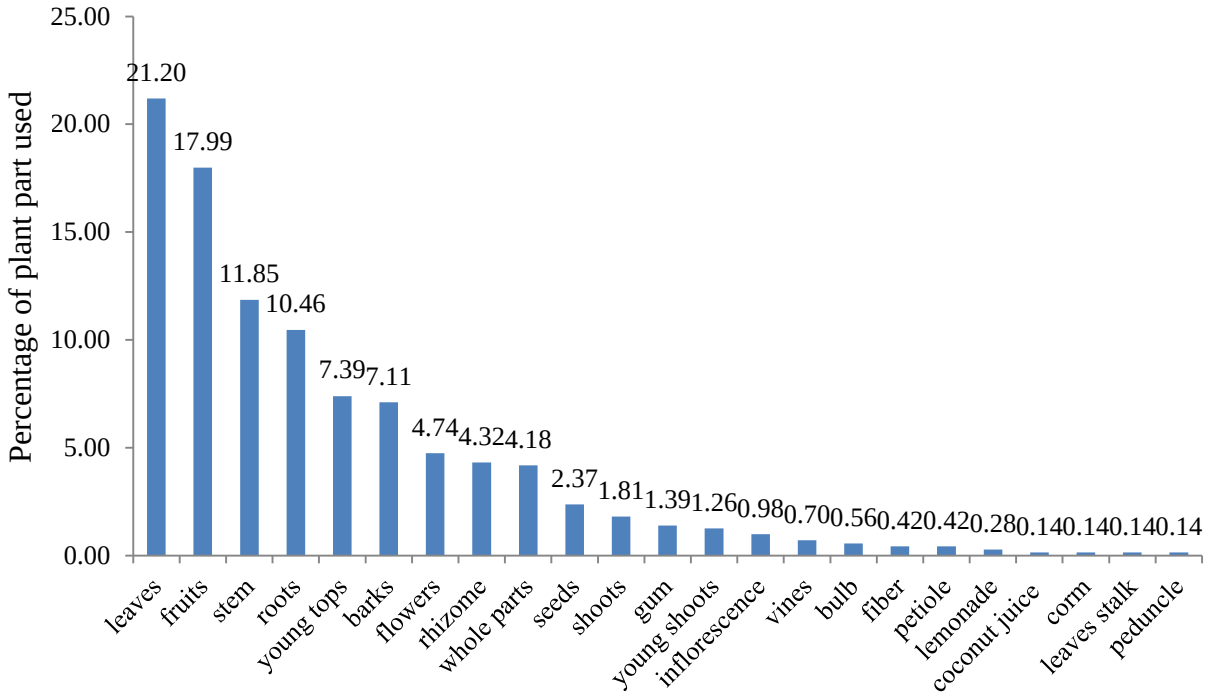


Figure 4.1 Plant part used

Figure 4.1 shows that leaves, fruits, and stems were the plants parts most used 21.20 %, 17.99 %, and 11.85 % respectively.

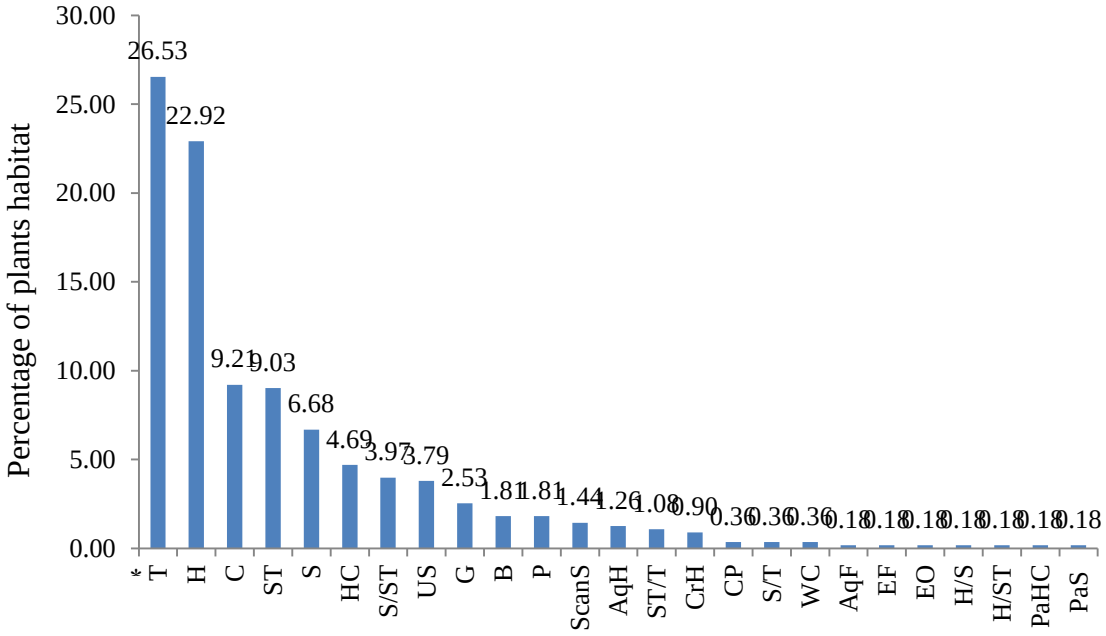


Figure 4.2 Plants habit

Figure 4.2 shows that tree was the most common plant habit (26.53%), followed by the herb (22.92%), and climber (C) (9.21%).

* H = Herb, T = Tree, ST = Shrubby tree, C = Climber, S = Shrub, S/ST = Shrub/Shrub tree, P = Palm, ScanS = Scandent Shrub, G= Grass, ST/T = Shrubby Tree/tree, US = Undershrub, CrH = Creeping Herb, HC = Herbaceous Climber, S/T = Shrub/Tree, WC = Woody Climber, AqH = Aquatic herb, B = Bamboo, CP = Climbing Palm limbing Palm, AqF = Aquatic Fern, EF = Epiphytic Fern, EO = Epiphytic Orchid,H/S = Herb/Shrub, H/ST = Herb / Shrubby Tree, PaHC = Parasitic Herbaceous Climber, PaS = Parasitic Shrub

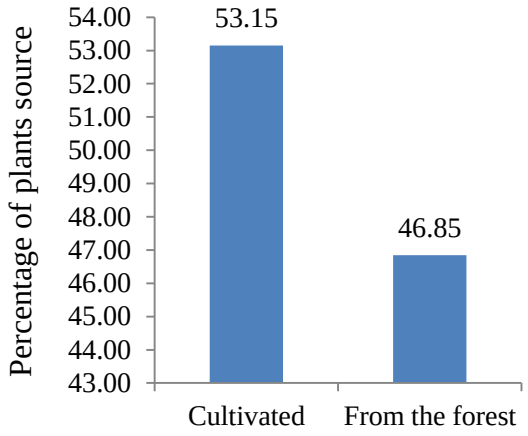


Figure 4.3 Plants source

Figure 4.3 shows that the most plants were gathered from cultivated areas (53.15%) followed by from the forest (46.85 %).

4.2 Genders, ages, and indigenous knowledge

Gender and age is compared with the indigenous knowledge of the ethnic groups in Nakhon Phanom province and this data is presented in Table 4.10-4.15.

Table 4.10 Indigenous knowledge by gender.

Gender	N	$\bar{x}$	SD	t	*Sig
Male	141	0.51	0.19		
Female	151	0.55	0.19	3.312	.070
Total	292	0.53	0.19		

* The mean difference is significant at the 0.05 level.

The indigenous knowledge for males and females was 0.51 and 0.55 respectively. The indigenous knowledge listed by males and females did not differ significantly (p>.05).

Table 4.11 Indigenous knowledge by age.

Age	N	$\bar{x}$	SD
15-30	87	0.34	0.04
31-50	102	0.50	0.10
> 50	103	0.73	0.14
Total	292	0.53	0.19

The Indigenous knowledge for age group 15-30 was 0.34, 31-50 was 0.50, and > 50 was 0.73 respectively. Older informants had significantly more indigenous knowledge than younger informants (p<.05).

Table 4.12 Comparison of indigenous knowledge by age.

	Sum of Squares	df	Mean Square	F	*Sig.
Between Groups	7.505	2	3.752	352.402	.000
Within Groups	3.077	289	.011		
Total	10.582	291			

* The mean difference is significant at the 0.05 level.

The difference of indigenous knowledge among the ethnic groups are different and is significant at the 0.05 level.

Table 4.13 Indigenous knowledge between ages

Age	15-30	31-50	> 50
15-30	-	-.16749*	-.39504*
31-50	.16749*	-	-.22755*
> 50	.39504*	.22755*	-

*. The mean difference is significant at the 0.05 level.

Table 4.13 shows that the difference of Indigenous knowledge between are different and is significant at the 0.05 level.

Table 4.14 Comparison of indigenous knowledge by the 7 ethnic groups

Ethnic group	N	$\bar{x}$	SD
Phu Thai	47	0.52	0.19
Kalerng	40	0.60	0.10
Kha	32	0.53	0.20
Sak	41	0.52	0.19
So	42	0.52	0.19
Yaw	44	0.51	0.19
Thai I- san	46	0.53	0.18
Total	292	0.53	0.19

The highest indigenous knowledge was Kalerng (0.60) followed by Thai i san and Kha (0.53 each). The lowest indigenous knowledge was Yaw (0.51)

Table 4.15 Comparison of indigenous knowledge among the seven ethnic groups.

			Sum of Squares	df	Mean Square	F	*Sig.
Between Groups	(Combined)		.186	6	.031	.849	.533
	Linear Term	Unweighted	.041	1	.041	1.125	.290
		Weighted	.034	1	.034	.942	.333
		Deviation	.152	5	.030	.831	.529
Within Groups			10.396	285	.036		
Total			10.582	291			

* The mean difference is significant at the 0.05 level.

The table 4.15 shows that the indigenous knowledge listed by the seven ethnic groups did not differ significantly (p>.05).

4.3 Comparative ethnobotany between the ethnic groups

Comparing the use of plants in the field of edible, medicine, rituals and other uses among the seven ethnic groups that are similar and different. Comparative on ethnobotany between the ethnic groups requires that ethnic groups are similar in their uses of the plant.

4.3.1 Edible plants

In total, two hundred and eight plant species in seventy-one plant families were registered as edible plants by all seven ethnic groups surveyed. A number of edible plant species were commonly used in more than one ethnic group.The commonly represented plant families for edible plants were Fabaceae (Twenty-three species), Zingiberaceae (sixteen species), and Poaceae (eleven species) (Table 4.20).
The similarites of edible plants is showen in table 4.16 and figure 4.4.

Table 4.16 The jaccard index (JI) of edible plants between the ethnic groups.

Ethnic group	Phu Thai	Thai I- San	Kaleung	Kha	Sak	So	Yaw
Phu Thai	1.000						
Thai I-San	0.937	1.000					
Kalerng	0.898	0.922	1.000				
Kha	0.932	0.937	0.907	1.000			
Sak	0.932	0.937	0.917	0.932	1.000		
So	0.932	0.917	0.917	0.913	0.951	1.000	
Yaw	0.956	0.922	0.922	0.898	0.927	0.937	1.000

Table 4.16 shows that the Jaccard Index (JI) of edible plants between Phu Thai and Yaw is the highest (JI = 0.956) and the lowest was between Kaleung and Phu Thai, and between Yaw and Kha (JI = 0.898 each).

The dendrogram topology resulting from cluster analysis of plants used as edible plants distinctly shows an isolated cluster of Kaleung that was separated from the other ethnic groups. Among the other six ethnic groups, high similarity was detected between Phu Thai and Yaw, whereas Kha and Thai I-san were most distinct and composition of So was more similar to the Sak. (Figure 4.4)

Phu Thai and Yaw have the highest similarities because both ethnic groups live close to each other. Kaleung differs from other tribes because of a distant settlement from the six ethnic groups.

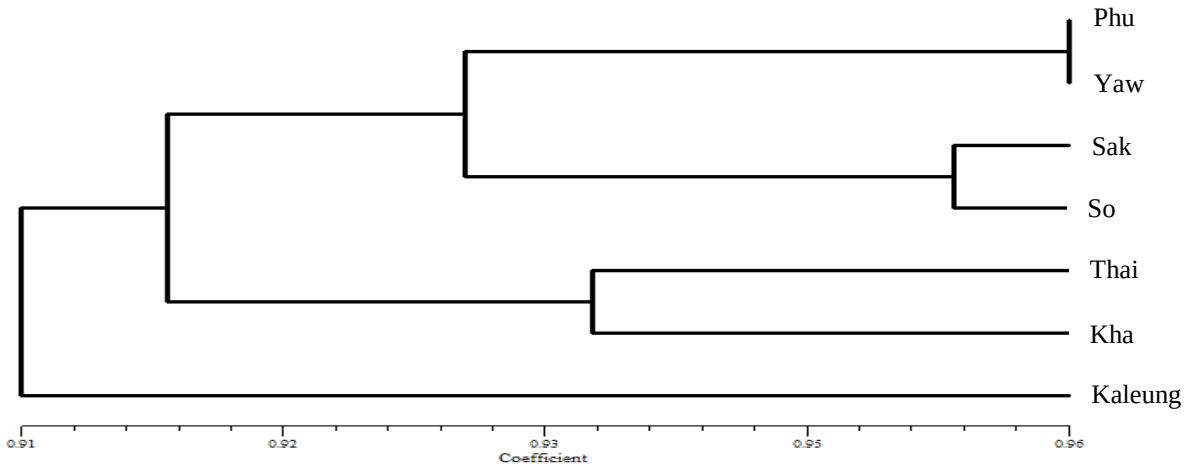


Figure 4.4 Dendrogram topology for comparison of edible plants species among all ethnic groups studied.

4.3.2 Medicinal plants

There were two hundred and three plant species in seventy five plant families which were used as medicinal plants among the seven ethnic groups. A number of medicinal plant species were commonly used in more than one ethnic group. The commonly represented plant families for medicinal plants were Fabaceae (twenty eight species), Zingiberaceae (fifteen species), and Malvaceae, and Lamiaceae (nine species each) (Table 4.21). The similarities of medicinal plants are shown in table 4.17 and figure 4.5.

Table 4.17 The jaccard Index (JI) of medicinal plants between the ethnic groups.

Ethnic group	Phu Thai	Thai I- San	Kaleung	Kha	Sak	So	Yaw
Phu Thai	1.000						
Thai I-San	0.749	1.000					
Kalerng	0.655	0.591	1.000				
Kha	0.767	0.752	0.639	1.000			
Sak	0.729	0.754	0.581	0.752	1.000		
So	0.773	0.788	0.626	0.718	0.749	1.000	
Yaw	0.793	0.739	0.596	0.748	0.759	0.793	1.000

Table 4.17 shows that the Jaccard Index (JI) of medicinal plants between Phu Thai and Yaw is the highest (JI = 0.793) and the lowest is between Kaleung and Sak (JI = 0.581). The dendrogram topology shows that the Phu Thai ethnic group is more similar to the Yaw, whereas another ethnic group, Thai I- San, shares more similarities to the So. Likewise, the Kha and Sak shares more similarities. The Kaleung was the most distinct and branched out as a separate group (Figure 4.5). Phu Thai and Yaw have the highest similarities because both ethnic groups live close to each other. Kaleung differs from other tribes because of a distant settlement from the six ethnic groups.

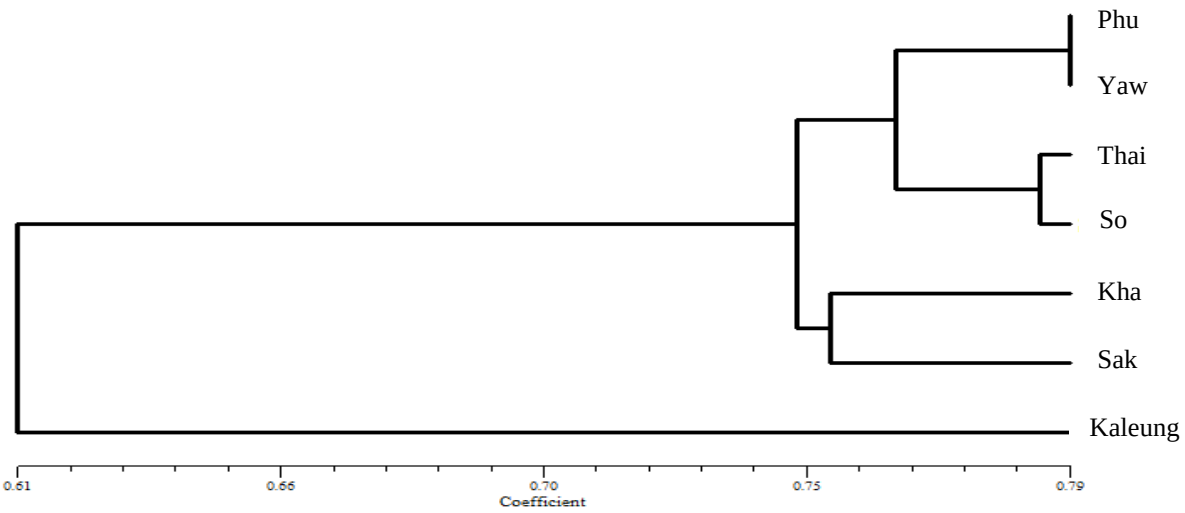


Figure 4.5 Dendrogram topology for comparison of medicinal plants species among all ethnic groups studied.

4.3.3 Cultural plants

In total, sixty three plants species in thirty three plant families were registered as cultural plants across all seven ethnic groups surveyed. The commonly represented plant families for edible plants were Fabaceae (eight species), Zingiberaceae, Apocynacea, Poaceae, Rubiacae, and Zigiberacea (four species each) (Table 4.22). The similarities of the plants are shown in table 4.18 and figure 4.6.

Table 4.18 The jaccard Index (JI) of cultural plants between the ethnic groups.

Ethnic group	Phu Thai	Thai I- San	Kaleung	Kha	Sak	So	Yaw
Phu Thai	1.000						
Thai I-San	0.778	1.000					
Kalerng	0.698	0.794	1.000				
Kha	0.778	0.746	0.794	1.000			
Sak	0.778	0.746	0.762	0.937	1.000		
So	0.778	0.746	0.762	0.905	0.905	1.000	
Yaw	0.730	0.825	0.937	0.825	0.794	0.825	1.000

Table 4.18 shows that the Jaccard Index (JI) of cultural plants between Kaleung and Yaw, and between Kha and Sak is the highest (JI = 0. 937) and the lowest is between Phu Thai and Kalerng (JI = 0.698).The significant result of the dendrogram shows that there are two distinct clusters. Among the 4 ethnic groups Kha and Sak are highly similar and among three ethnic groups, Kaleung and Yaw have high simiralities (Figure 4.6). Phu Thai, Kha, Sak and So have their own culture, traditions, and distinctive identity, such as language and beliefs. However, rituals or beliefs of indigenous plant uses are similar. Traditions of Phu Thai, such as Phu Thai dance, the tradition of welcoming visitors, the traditional healthcare spirit, traditions of Kha, such as the tradition of philanthropy in each month of the year, traditions of Sak, such as “Sak Ten Sak”, and traditions of So, such as “Sang san nam” and” So Tung bung” ceremony.

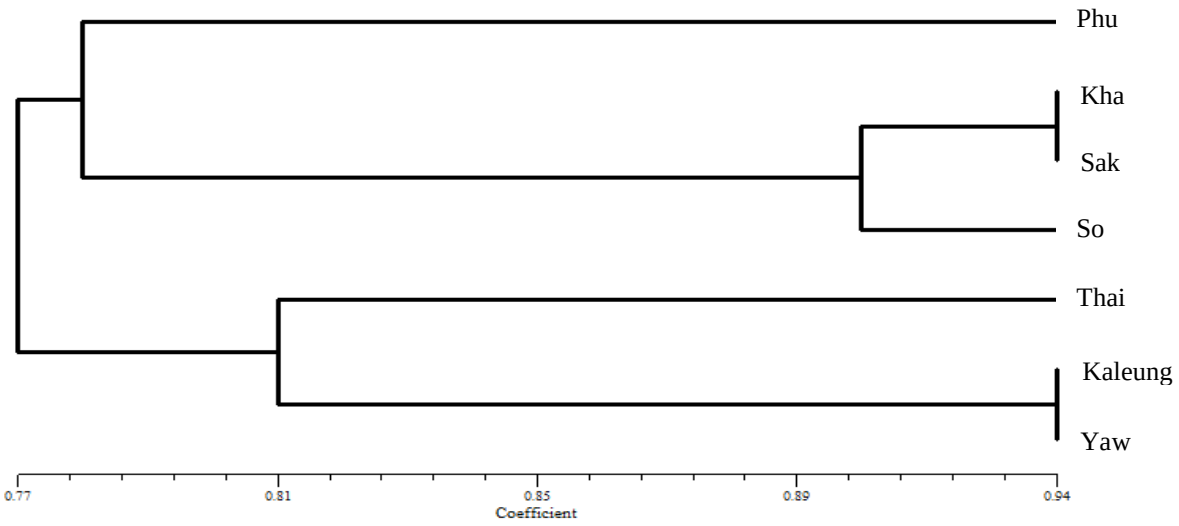


Figure 4.6 Dendrogram topology for comparison of plants species among all ethnic groups studied.

4.3.4 Other uses plants

Plants are used in other areas such building houses, tools, dyes, fuel etc. There were eighty-three plant species in thirty-five plant families, which were used as cultural plants in the seven ethnic groups. The commonly represented plant families for other uses were Fabaceae (eighteen species), Dipterocarpaceae, and Poaceae (six species each) (Table 4.23). The similarities of other uses for plants is shown in table 4.19 and figure 4.7.

Table 4.19 The jaccard Index (JI) of other uses of plants between the ethnic groups.

Ethnic group	Phu Thai	Thai I- San	Kaleung	Kha	Sak	So	Yaw
Phu Thai	1.000						
Thai I-San	0.759	1.000					
Kalerng	0.639	0.783	1.000				
Kha	0.807	0.952	0.735	1.000			
Sak	0.795	0.964	0.747	0.988	1.000		

Table 4.19 The jaccard Index (JI) of other uses of plants between the ethnic groups (continued).

Ethnic group	Phu Thai	Thai I- San	Kaleung	Kha	Sak	So	Yaw
So	0.747	0.940	0.795	0.916	0.928	1.000	
Yaw	0.735	0.904	0.807	0.807	0.916	0.892	1.000

Table 4.19 shows that the jaccard index (JI) of other uses of plants between Kha and Sak is the highest (JI = 0.988) and the lowest is between Phu Thai and Kalerng (JI = 0.639).

The dendrogram topology resulting from the cluster analysis of other plants used distinctly shows an isolated cluster of the Phu Thai that are separated from the other ethnic groups. Kha and Sak show high similarities (Figure 4.7).

Phu Thai, whose cultural traditions inherited from living ancestors, is quite different from other ethnic groups. Therefore, the use of the plant for other uses is unlike the other six ethnic groups.

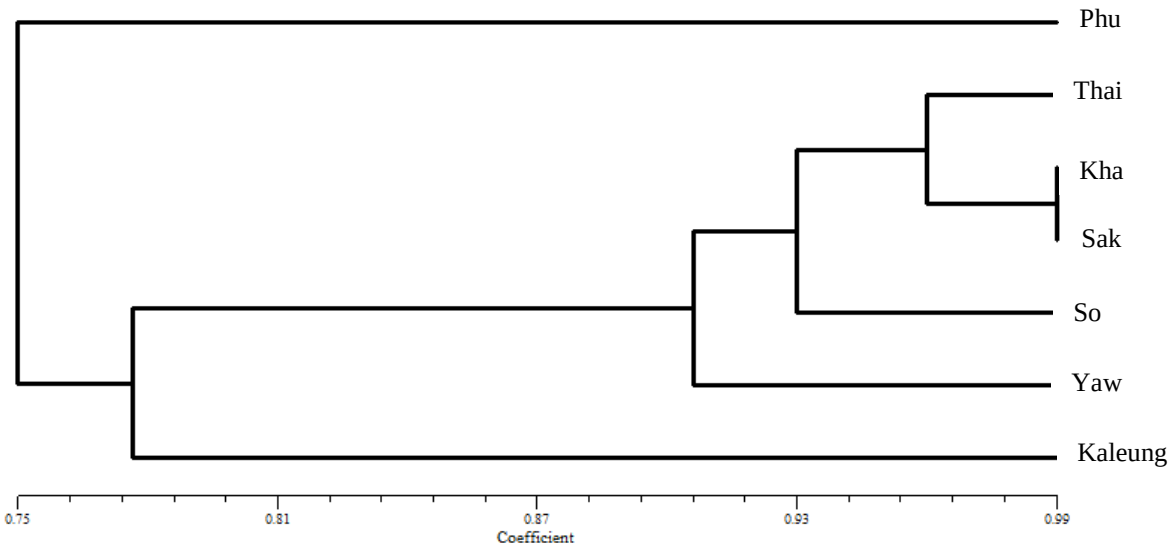


Figure 4.7 Dendrogram topology for the comparison of other uses of plants species among all ethnic groups studied.

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province.

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Acanthaceae	*Asystasia gangetica* (L.) T. Anderson subsp. *Gangetica* (RPH 046)	baya, phak omsap	young tops	1,2,7,4,5	US	Cu
Alismataceae	*Limnocharis flava* Buch. (RPH 215)	bon chin	stem,young tops, flowers	1,2,3,4, 5,6,7	AqH	Fr
Amaranthaceae	*Amaranthus lividus* L. (RPH 027)	phak khom	young tops, leaves	1,2, 3,4,5,6,7	H	Cu
	Amaranthus spinosus Linn. (RPH 028)	phak khom nam	young tops, leaves	1,2, 3,4,5,6,7	H	Fr
Amaryllidaceae	*Allium ascalonicum* L. (RPH 017)	hom	bulb, leaves	1,2, 3,4,5,6,7	H	Cu
	Allium sativum L. (RPH 018)	kratiam	bulb, leaves	1,2, 3,4,5,6,7	H	Cu
	Allium tuberosum Rottler ex Spreng. (RPH 019)	kui chai	leaves	1,2, 3,4,5,6,7	H	Cu
Anacardiaceae	*Buchanania latifolia* Roxb. (RPH 065)	ma muang hua maeng wan	fruits	1,2, 3,4,5,6,7	T	Fr
	Mangifera caloneura Kurz (RPH 221)	ma muang kalon	fruits	1,2, 3,4,5,6,7	T	Fr
	Mangifera indica L. (RPH 222)	ma muang	fruits	1,2, 3,4,5,6,7	T	Cu
	Spondias pinnata (L. f.) Kurz (RPH 320)	ma kok	fruits, young tops	1,2, 3,4,5,6,7	T	Fr
Annonaceae	*Annona squamosa* L. (RPH 035)	noi na	fruits	1,2, 3,4,5,6,7	S/ST	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
	Monocarpia vaginalis (Burm. f.) C. Presl ex Kunth var. *vaginalis* (RPH 238)	phak khiat	leaves	1,3,5,6,7	AqH	Fr
	Polyalthia evecta (Pierre) Finet & Gagnep. (RPH 282)	nom noi	fruits	1,2, 3,4,5,7	S	Fr
	Uvaria rufa Blume (RPH 346)	nom khwai	fruits	1,2, 3,4,5,6,7	C	Fr
Apiaceae	*Anethum graveolens* L. (RPH 034)	phak chi lao	whole parts	1,2, 3,4,5,6,7	H	Cu
	Apium graveolens L. (RPH 038)	khuen-chai	whole parts	1,2, 3,4,5,6,7	H	Cu
	Centella asiatica (L.) Urban. (RPH 086)	bua bok	whole parts	1,2, 3,4,5,6,7	H	Fr
	Coriandrum sativum L. (RPH 108)	phak chi	whole parts	1,2, 3,4,5,6,7	H	Cu
	Eryngium foetidum L. (RPH 158)	phak chi farang	leaves	1,2, 3,4,5,6,7	H	Cu
	Trachyspermum roxburghianum (DC.) H. Wolff *Coriandrum* spp. (RPH 343)	phak chi rai	whole parts	1,2, 3,4,5,6,7	H	Cu
Apocynaceae	*Aganonerion polymnorphum* Pierre ex Spire (RPH 013)	som lom	young tops	1,2, 3,4,5,6,7	C	Fr
	*Amphineurion marginatum (*Roxb.) D. J. Middleton (RPH 031)	mok khruea	young shoots	1,2, 3,4,5,6,7	C	Fr
	Dregea volubilis (L. f.) Benth. ex Hook. f. (RPH 153)	kra thung ma ba,nguan mu	young tops	1,2,6,7	C	Fr

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
	Myriopteron extensum (Wight & Arn.) K. Schum. (RPH 247)	cha em	young tops,fruits	1,2,5,6,7	C	Fr
	Telosma cordata (Burm. f.) Merr. (RPH 334)	kha chon	young shoots, flowers	1,2,3,4, 5,6,7	C	Cu
	Willughbeia edulis Roxb. (RPH 348)	katang ka tio	fruits	2,3,4,5, 6,7	C	Fr
Araceae	*Amorphophallus paeoniifolius (*Dennst.) Nicolson (RPH 030)	buk khung khok	stem	5,6,7	H	Fr
	Arisaema petiolatum Gagnep. (RPH 043)	buk tiang	stem	1,2,3,4, 5,6,7	H	Fr
	Colocasia esculenta Schott (RPH 103)	phueak	corm	1,2,3,4, 5,6,7	H	Cu
	Colocasia gigantea Hook. f. (RPH 104)	khun	leaves stalk	1,2, 3,4,5,6,7	H	Cu
	Lasia spinosa Thw. (RPH 210)	phak nam	young tops	1,2,5	H	Fr
	Wolffia globosa (Roxb.) Hartog & Plas (RPH 349)	khai nam	whole parts	1,2,4,5, 6,7	AqH	Fr
Arecaceae	*Borassus flabellifer* L. (RPH 061)	tan	fruits	1,2,3,4, 5,6,7	P	Fr
	Calamus viminalis Willd. (RPH 071)	wai	young shoots	1,2, 3,4,5,6,7	CP	Fr
	Cocos nucifera L. (RPH 102)	ma phrao	young tops,fruits	1,2, 3,4,5,6,7	P	Cu
	Rhapis laosensis Becc. (RPH 288)	chang	stem	3	p	Fr

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Asteraceae	*Acmella oleracea* (L.) R. K. Jansen (RPH 008)	phak khrat	whole parts	1,2,3,4, 6,7	H	Fr
	Blumea napifolia DC. (RPH 059)	phak kat na	leaves	1,2,3,4, 5,6,7	H	Fr
	Lactuca sativa L. (RPH 206)	phak kat hom	leaves	1,2,3,4, 5,6,7	H	Cu
Basellaceae	*Basella alba* L. (RPH 055)	phak pang	young tops	1,2,3,4, 5,6,7	HC	Cu
Bignoniaceae	*Dolichandrone columnaris* Santisuk(RPH 152)	kae na	flowers	1,2,3,4, 5,6,7	T	Fr
	Fernandoa adenophylla (Wall. ex G. Don) Steenis(RPH 163)	khae bit	flowers	2	T	Fr
	Millingtonia hortensis L. f. (RPH 231)	pip	leaves	3,4,5,6,7	T	Fr
	Oroxylum indicum (L.) Benth. ex Kurz (RPH 257)	pheka	fruits	1,2, 3,4,5,6,7	ST	Fr
Brassicaceae	*Brassica juncea* (L.) Czern. (RPH 062)	phak kat khiao	young tops, leaves	1,2,3,4, 5,6,7	H	Cu
	Brassica oleracea L. Group *Capitata* (RPH 063)	kalam pli	whole parts	1,2,3,4, 5,6,7	H	Cu
Bromeliaceae	*Ananas comosus* (L.) Merr. (RPH 032)	sapparot	fruits	1,2,3,4, 5,6,7	H	Cu
Burseraceae	*Canarium subulatum* Guillaumin (RPH 074)	ma kok kluean	fruits	1,2, 3,4,5,6,7	T	Fr

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Capparidaceae	*Crateva adansonii* DC. subsp. *trifoliata* Jacobs (RPH 109)	phak kum	flowers,young tops	1,2,3,4, 5,6,7	T	Cu
Caricaceae	*Carica papaya* L. (RPH 079)	mala kho	fruits	1,2,3,4, 5,6,7	ST	Cu
Cleomaceae	*Cleome gynandra* L. (RPH 098)	phak sian	young tops,leaves	1,2, 3,4,5,6,7	H	Cu
Clusiaceae	*Garcinia cowa* Roxb. ex Choisy (RPH 168)	chamuang	fruits,young tops	1,2, 3,5, 6,7	T	Fr
	Garcinia nigrolineata Planch. ex T. Anderson (RPH 169)	cha muang	young tops, fruits	1,2,3,4, 5,6,7	ST	Fr
Combretaceae	*Terminalia chebula* Retz. var. chebula (RPH 337)	samo	fruits	1,2,3,4, 5,6,7	T	Fr
Convolvulaceae	*Cuscuta chinensis* Lam. (RPH 126)	phak mai	whole parts	1,2, 3,4,5,6,7	PaHC	Fr
	Ipomoea aquatica Forssk. (RPH 194)	phak bung	young tops	1,2, 3,4,5,6,7	CrH	Cu
	Ipomoea batatas (L.) Lam. (RPH 195)	man thet	roots	1,2, 3,4,5,6,7	CrH	Cu
Cucurbitaceae	*Benincasa hispida* (Thunb.) Cogn. (RPH 057)	fak	fruits	1,2, 3,4,5,6,7	HC	Cu
	Coccinia grandis (L.) Voigt (RPH 101)	phak tam lueng	young tops	1,2, 3,4,5,6,7	HC	Cu
	Cucumis melo L. (RPH 118)	taeng thai	fruits	1,2, 3,4,5,6,7	HC	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
	Cucurbita moschata Duchesne (RPH 119)	fak thong	fruits,young shoots	1,2, 3,4,5,6,7	HC	Cu
	Lagenaria siceraria (Molina) Standl. (RPH 207)	namtao	young tops, fruits	1,2, 3,4,5,6,7	HC	Cu
	Luffa acutangula (L.) Roxb. (RPH 218)	buap liam	young tops, fruits	1,2, 3,4,5,6,7	HC	Cu
	Momordica charantia L. (RPH 236)	ma ra	fruits,young tops,leaves	1,2, 3,4,5,6,7	HC	Cu
	Momordica cochinchinensis (Lour.) Spreng. (RPH 237)	fak khao	young tops, fruits	1,2, 3,4,5,6,7	HC	Cu
	Trichosanthes cucumerina L. (RPH 344)	buap ngu	young tops, fruits	1,2, 3,4,5,6,7	HC	Cu
Dioscoreaceae	*Dioscorea alata* L. (RPH 140)	man luet	roots	1,2, 3,4,5,6,7	HC	Fr
	Dioscorea hispida Dennst. (RPH 141)	kloi	roots	1,2, 3,4,5,6,7	HC	Fr
	Dioscorea pseudotomentosa Prain & Burkill (RPH 142)	man saeng hin	roots	1,2, 3,4,5,6,7	HC	Fr
Ebenaceae	*Diospyros filipendula* Pierre ex Lecomte (RPH 144)	lam bit dong	young tops, fruits	1,2,4,5,6	T	Fr
Elaeocarpaceae	*Elaeocarpus hygrophilus* Kurz (RPH 155)	ma kok nam	fruits	1,2, 3,4,5,6,7	T	Fr
Euphorbiaceae	*Manihot esculenta* Crantz (RPH 223)	man sampalang	roots	1,2, 3,4,5,6,7	S/ST	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Fabaceae	*Acacia concinna* (Willd.) DC. (RPH 003)	som poi	leaves	1,2, 3,5,6,7	ScanS	Fr
	Acacia Pennata (L.) Willd.subsp.insuavis Nielsen(RPH 005)	cha om	young tops	1,2, 3,4,5,6,7	C	Cu
	Bauhinia malabarica Roxb. (RPH 056)	som siao	young tops	1,2, 4,5,6,7	T	Cu
	Butea monosperma (Lam.) Taub. (RPH 066)	thong kwao	flowers	1,2, 3,4,5,6,7	T	Fr
	Caesalpinia mimosoides Lam. (RPH 068)	cha rueat	young tops	1,2, 3,4,5,6,7	C	Fr
	Cajanus cajan (L.) Millsp. (RPH 070)	thua rae	fruits	1,2, 3,4,5,6,7	S	Fr
	Chamaecrista mimosoides (L.) Greene (RPH 088)	phak krachet nok	young tops, leaves	1,2, 3,4,5,6,7	US	Fr
	Clitoria ternatea L. (RPH 100)	anchan	flowers	1,2,3,4, 5,6,7	C	Fr
	Dialium cochinchinense Pierre (RPH 137)	khleng	fruits	1,2, 3,4,5,6,7	T	Fr
	Lablab purpureus (L.) Sweet (RPH 205)	thua paep	fruits	1,2, 3,4,5,6,7	C	Cu
	Leucaena leucocephala (Lam.) de Wit (RPH 214)	kra thin thai	fruits,young tops	1,2, 3,4,5,6,7	H/ST	Cu
	Neptunia oleracea Lour. (RPH 251)	phak krachet	young shoots	1,2, 3,4,5,6,7	AqH	Fr

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Fabaceae	*Pachyrhizus erosus* (L.) Urb. (RPH 261)	man kaeo	roots	1,2, 3,4,5,6,7	HC	Cu
	Pithecellobium dulce (Roxb.) Benth. (RPH 279)	ma kham thet	fruits	1,2, 3,4,5,6,7	T	Cu
	Psophocarpus tetragonolobus (L.) DC. (RPH 285)	thua phu	fruits	1,2, 3,4,5,6,7	HC	Cu
	Senna siamea (Lam.) H. S. Irwin & Barneby (RPH 302)	khi lek	young tops	1,2, 3,4,5,6,7	T	Fr
	Sesbania grandiflora (L.) Poir. (RPH 305)	kae	flowers,young tops	1,2, 3,4,5,6,7	ST	Cu
	Sesbania javanica Miq. (RPH 306)	sano kin dok	flowers	1,2, 3,4,5,6,7	US	Cu
	Sindora siamensis Teijsm. ex Miq. var. *siamensis* (RPH 311)	makha tae	seeds	1,2, 3,4,5,6,7	T	Fr
	Tamarindus indica L. (RPH 332)	ma kham	fruits,young tops,leaves	1,2, 3,4,5,6,7	T	Cu
	Arachis hypogaea L. (RPH 039)	thua lisong	fruits,young tops	1,2, 3,4,5,6,7	HC	Cu
	Xylia xylocarpa (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen (RPH 350)	dang	fruits	1,2, 3,4,5,6,7	T	Fr
	Vigna unguiculata (L.) Walp. subsp. *unguiculata* (RPH 347)	thua dam	fruits	1,2, 3,4,5,6,7	HC	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Fagaceae	*Castanopsis piriformis* Hickel & A. Camus (RPH 082)	ko hin	fruits	1,2, 3,4,5,6,7	T	Fr
Hypericaceae	*Cratoxylum formosum* (Jacq.) Benth. & Hook. f. ex Dyer subsp. *pruniflorum* (Kurz) Gogelein (RPH 111)	tio som	young tops	1,2, 3,4,5,6,7	T	Fr
Irvingiaceae	*Irvingia malayana* Oliv. ex A. W. Benn. (RPH 197)	krabok	fruits	1,2, 3,4,5,6,7	T	Fr
Lamiaceae	*Mentha cordifolia* Opiz ex Fresen ex Fresen (RPH 229)	saranae	leaves	1,2, 3,4,5,6,7	H	Cu
	Ocimum basilicum L. (RPH 255)	horapha	leaves, inflorescence	1,2, 3,4,5,6,7	US	Cu
	Ocimum tenuiflorum L. (RPH 256)	kraproa	leaves	1,2, 3,4,5,6,7	US	Cu
	Perilla frutescens (L.) Britton (RPH 269)	nga khi mon	leaves	1, 7	H	Cu
	Plectranthus amboinicus (Lour.) Spreng. (RPH 280)	hu suea	leaves	1,2, 3,4,5,6,7	H	Cu
	Ocimum africanum Lour. (RPH 254)	maeng lak	leaves, inflorescence	1,2, 3,4,5,6,7	H	Cu
Lecythidaceae	*Barringtonia acutangula* (L.) Gaertn. (RPH 054)	chik nam	leaves,young shoots	1,2, 3,4,5,6,7	ST/T	Cu
	Careya arborea Roxb. (RPH 078)	kradon	fruits,young tops	1,2, 3,4,5,6,7	T	Fr
Lythraceae	*Punica granatum* L. var. *granatum* (RPH 287)	thapthim	fruits	1,2, 3,4,5,6,7	S	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Malvaceae	*Hibiscus sabdariffa* L. (RPH 187)	krachiap daeng	fruits	1,2, 3,4,5,6,7	H	Cu
	Microcos tomentosa Sm. (RPH 230)	phlap phla	fruits	2,3,4, 7	T	Fr
Marantaceae	*Maranta arundinacea* L. (RPH 224)	sa khu	roots	1,2, 3,4,5,6,7	H	Cu
Marsileaceae	*Marsilea crenata* C. Presl (RPH 225)	phak wan	whole parts	1,2, 3,4,5,6,7	AqF	Fr
Meliaceae	*Azadirachta indica* A. Juss. (RPH 049)	sadao	young tops, inflorescence	1,2, 3,4,5,6,7	T	Cu
	Sandoricum koetjape (Burm. f.) Merr. (RPH 295)	kraton	fruits	1,2, 3,4,5,6,7	T	Cu
Memecylaceae	*Memecylon edule* Roxb. (RPH 228)	phlong mueat	leaves	1,2, 3,5,6,7	S/ST	Fr
Menispermaceae	*Cissampelos pareira* L. var. *hirsuta* (Buch. ex DC.) Forman (RPH 092)	krung kha mao	leaves	1,2, 3,4,5,6,7	C	Fr
	Tiliacora triandra (Colebr.) Diels (RPH 341)	thao ya nang	leaves	1,2, 3,4,5,6,7	C	Fr
Molluginaceae	*Glinus oppositifolius* (L.) A. DC. (RPH 173)	sadao din	shoots, leaves	1,2, 3,4,5,6,7	H	Fr
	Mollugo pentaphylla L. (RPH 235)	ya khai hao	shoots, leaves	1,2, 3,4,5,6,7	H	Fr
Moraceae	*Artocarpus heterophyllus* Lam. (RPH 044)	khanun	fruits	1,2, 3,4,5,6,7	T	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Moraceae	*Ficus racemosa* L. (RPH 165)	ma duea u thum phon	fruits	1,2, 3,4,5,6,7	T	Fr
	Streblus asper (RPH 321)	khoi	fruits	1,2, 3,4,5,6,7	T	Fr
	Morus alba L. (RPH 242)	mon	leaves, fruits	1,2, 3,4,5,6,7	ST	Cu
Moringaceae	*Moringa oleifera* Lam. (RPH 241)	ma rum	fruits,young tops	1,2, 3,4,5,6,7	ST	Cu
Mulpighiaceae	*Malpighia glabra* L. (RPH 220)	choe ri	fruits	1,2, 4,5,6,7	S	Cu
Muntingiaceae	*Muntingia calabura* L. (RPH 243)	ta khop farang	fruits	1,2, 3,4,5,6,7	ST	Cu
Musaceae	*Musa* × *paradisiaca* L. (RPH 244)	kluai namwa	fruits,flowers	1,2, 3,4,5,6,7	H	Cu
	Musa balbisiana Colla (RPH 245)	kluai tani	leaves,whole parts, fruits	1,2, 3,4,5,6,7	H	Cu
	Ensete glaucum (Roxb.) Cheesman (RPH 157)	kluai nuan	fruits	1,2, 3,4,5,6,7	H	Cu
Myrtaceae	*Psidium guajava* L. (RPH 284)	farang	fruits	1,2, 3,4,5,6,7	ST	Cu
	Syzygium cinereum (Kurz) Chantar. & J. Parn. (RPH 327)	wa	fruits	1,2, 3,4,5,6,7	T	Fr
	Syzygium antisepticum (Blume) Merr. & L. M. Perry(RPH 326)	samet chun	young tops	1,2, 3,4,5,6,7	ST/T	Fr

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Myrtaceae	*Syzygium jambos* (L.) Alston (RPH 328)	chomphu nam dok mai	fruits	1,2, 3,4,5,6,7	S/ST	Cu
Nelumbonaceae	*Nelumbo nucifera* Gaertn. (RPH 248)	bua luang	fruits,roots	1,2, 3,4,5,6,7	AqH	Fr
Nymphaeaceae	*Nymphaea pubescens* Willd (RPH 253)	bua kin sai	peduncle	1,2, 3,4,5,6,7	AqH	Fr
Opiliaceae	*Meliantha suavis* Pierre (RPH 226)	phak wan	young tops, leaves	1,2, 3,4,5,6,7	T	Fr
Oxalidaceae	*Averrhoa bilimbi* L. (RPH 047)	taling pling	fruits	1,2, 5,6,7	ST	Cu
	Averrhoa carambola L. (RPH 048)	ma fueang	fruits	1,2, 3,4,5,6,7	ST	Cu
Pandanaceae	*Pandanus amaryllifolius* Roxb. (RPH 263)	toei	leaves	1,2, 3,4,5,6,7	S	Cu
Passifloraceae	*Passiflora laurifolia* L. (RPH 266)	ka thok rok	fruits	1,2, 3,4,5,6,7	C	Fr
Pedaliaceae	*Sesamum indicum* L. (RPH 304)	nga	seeds	1,2, 3,4,5,6,7	H	Cu
Phyllanthaceae	*Antidesma acidum* Retz. (RPH 036)	mao	fruits	1,2, 3,4,5,6,7	T	Fr
	Baccaurea ramiflora Lour. (RPH 050)	ma fai	fruits	1,2, 3,4,5,6,7	T	Cu
	Hymenocardia punctata Wall. ex Lindl. (RPH 191)	faep nam	fruits	1, 6,7	S/T	Fr

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Phyllanthaceae	*Phyllanthus acidus* (L.) Skeels (RPH 272)	ma yom	fruits,young tops	1,2, 3,4,5,6,7	ST	Cu
	Phyllanthus emblica L. (RPH 273)	ma kham pom	fruits	1,2, 3,4,5,6,7	ST/T	Fr
	Sauropus androgynus (L.) Merr. (RPH 296)	phak wan ban	young tops,leaves	1,2, 3,4,5,6,7	S/ST	Cu
Piperaceae	*Peperomia pellucida* (L.) Kunth (RPH 268)	phak kasang	leaves, shoots	2,4, 5,6	H	Fr
	Piper retrofractum Vahl (RPH 277)	di pli	fruits	1,2, 3,4,5,6,7	C	Cu
	Piper rostratum Roxb. (RPH 278)	cha plu	leaves	1,2, 3,4,5,6,7	CrH	Cu
	Piper nigrum L. (RPH 276)	phrik thai	fruits	1,2, 3,4,5,6,7	C	Cu
Poaceae	*Bambusa multiplex* (Lour.) Raeusch. ex Schult. f. (RPH 051)	phai sang phrai	bamboo shoots	1,2, 3,4,5,6,7	B	Cu
	Bambusa nutans Wall. ex Munro (RPH 052)	phai bong	bamboo shoots	1,2, 3,4,5,6,7	B	Cu
	Cymbopogon citratus (DC.) Stapf (RPH 128)	ta khrai	leaves,stem	1,2, 3,4,5,6,7	G	Cu
	Coix lachryma-jobi L. (RPH 319)	dueai	seeds	1,2, 3,4,5,6,7	G	Cu
	Dendrocalamus asper (Schultes & J. H. Schultes) Backer ex K. Heyne (RPH 133)	phai tong	bamboo shoots	1,2, 3,4,5,6,7	B	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Poaceae	*Gigantochloa albociliata* (Munro) Kurz (RPH 172)	phai rai	bamboo shoots	1,2, 3,4,5,6,7	B	Cu
	Oryza sativa L. (RPH 259)	khao	seeds	1,2, 3,4,5,6,7	G	Cu
	Saccharum officinarum L. (RPH 293)	oi	stem	1,2, 3,4,5,6,7	G	Cu
	Thyrsostachys siamensis Gamble (RPH 340)	phai ruak	bamboo shoots	1,2, 3,4,5,6,7	B	Cu
	Dendrocalamus strictus (Roxb.) Nees (RPH 134)	phai sang pai	bamboo shoots	1,2, 3,4,5,6,7	B	Fr
	Zea mays L. (RPH 227)	khao phot	fruits	1,2, 3,4,5,6,7	G	Cu
Polygonaceae	*Persicaria odorata* (Lour.) Soják (RPH 271)	phak phai	young tops,leaves	1,2, 3,4,5,6,7	H	Cu
Primulaceae	*Ardisia pilosa* H. R. Fletcher (RPH 040)	phuang tum hu	fruits	1,7	S	Cu
Rhamnaceae	*Colubrina asiatica* (L.) Brongn. var. *asiatica* (RPH 105)	khan song	young tops	1,2, 3,4,5,6,7	C	Cu
	Ziziphus oenoplia (L.) Mill. var. *oenoplia* (RPH 358)	lep yiao	fruits	1,2, 3,4,5,6,7	C	Fr
Rubiaceae	*Canthium berberidifolium* Geddes (RPH 075)	ngiang duk	fruits	1,7	S	Fr
Rubiaceae	*Morinda citrifolia* L. (RPH 239)	yo ban	fruits	1,2, 3,4,5,6,7	ST	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Rubiaceae	*Paederia linearis* Hook. f. var. *linearis* (RPH 262)	tot mu tot ma	leaves,young tops,roots	1,2, 3,4,5,7	C	Fr
Rutaceae	*Aegle marmelos* (L.) Corrêa ex Roxb. (RPH 011)	ma tum	fruits,young tops	1,2, 3,4,5,6,7	T	Fr
	Citrus × *aurantifolia* (Christm.) Swingle (RPH 094)	manoa	fruits,young tops	1,2, 3,4,5,6,7	ST	Cu
	Citrus hystrix DC. (RPH 095)	ma krut	leaves	1,2, 3,4,5,6,7	ST	Cu
	Citrus ichangensis Swingle (RPH 096)	som lawo	fruits	1,2, 3,4,5,6,7	ST	Cu
	Feroniella lucida (Scheff.) Swingle (RPH 164)	krasang	young tops	3, 6,7	ST	Fr
Salicaceae	*Flacourtia indica* indica (Burm. f.) Merr. (RPH 167)	ta khop pa	fruits	1,2, 3,4,5,6,7	ST	Fr
	Nephelium hypoleucum Kurz (RPH 250)	kho laen	fruits	1,2, 3,4,5,6,7	ST	Fr
Sapindaceae	*Lepisanthes rubiginosa* (Roxb.) Leenh. (RPH 213)	ma huat	fruits	1,2, 3,4,5,6,7	S/ST	Fr
	Schleichera oleosa (Lour.) Merr. (RPH 297)	ta khro	fruits	1,2, 3,4,5,6,7	T	Fr
	Dimocarpus longan Lour. var. *longan* (RPH 139)	lum yai	fruits	1,2, 3,4,5,6,7	T	Cu
Sapotaceae	*Chrysophyllum cainito* L. (RPH 091)	sata aeppoen	fruits	1,2, 3,4,5,6,7	T	Cu
	Pouteria campechiana (Kunth) Baehni (RPH 283)	lamut khamen	fruits	1,5,6,7	T	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Saururaceae	*Houttuynia cordata* Thunb. (RPH 190)	phak khao thong	leaves,young tops	1,2, 3,4,5,6,7	H	Cu
Scorphulariaceae	*Limnophila aromatica* (Lam.) Merr. (RPH 216)	phak kha yaeng	leaves,young tops	1,2, 3,4,5,6,7	H	Fr
Solanaceae	*Capsicum annuum* L. (RPH 076)	phrik	fruits	1,2, 3,4,5,6,7	US	Cu
	Solanum incanum L. (RPH 314)	ma khuea khuen	fruits	1,2, 3,4,5,6,7	US	Cu
	Solanum lycopersicum L. (RPH 315)	ma khuea thet	fruits	1,2, 3,4,5,6,7	H	Cu
	Solanum melongena L. (RPH 316)	ma khuea yao	fruits	1,2, 3,4,5,6,7	US	Cu
	Solanum stramoniifolium Jacq. (RPH 317)	ma uek	fruits	1,2, 3,4,5,6,7	US	Cu
	Solanum torvum Sw. (RPH 318)	ma khuea phuang	fruits	1,2, 3,4,5,6,7	S	Cu
	Solanum anguivi Lam. (RPH 313)	ma waeng	fruits	1,2, 3,4,5,6,7	S	Cu
Symplocaceae	*Symplocos racemosa* Roxb. (RPH 235)	mueat	leaves	1,2, 3,4,5,6,7	S/ST	Fr
Vitaceae	*Cissus hastata* Miq. (RPH 093)	som sandan	leaves	1,3, 5,6,7	C	Fr
Zingiberaceae	*Alpinia conchigera* Griff. (RPH 022)	kha ling	rhizome, young shoots	1,2, 3,4,5,6,7	H	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Zingiberaceae	*Alpinia galanga* (L.) Willd. (RPH 023)	kha	inflorescence ,rhizome	1,2, 3,4,5,6,7	H	Cu
	Alpinia siamensis K. Schum. (RPH 024)	kha ban	rhizome, inflorescence	1,2, 3,4,5,6,7	H	Cu
	Alpinia zerumbet (RPH 025)	kha pa	rhizome	1,2, 3,4,5,6,7	H	Cu
	Amomum villosum Lour. var. *xanthioides* (Wall. ex Baker) T. L. Wu & S. J. Chen (RPH 029)	reo	fruits	3,5, 7	H	Cu
	Boesenbergia rotunda (RPH 060)	khra chai	rhizome	1,2, 3,4,5,6,7	H	Cu
	Curcuma longa L. (RPH 121)	khamin chan	rhizome	1,2, 3, 7	H	Cu
	Curcuma parviflora Wall. (RPH 123)	krachiao khao	flowers	1,2, 3,4,5,6,7	H	Fr
	Curcuma sessilis Gage (RPH 124)	krachiao dang	flowers	1,2, 3,4,5,6,7	H	Cu
	Hedychium coronarium (RPH 181)	ma ha hong	rhizome	1, 4, 6,7	H	Cu
	Kaempferia galanga L. (RPH 202)	pro hom	young shoots, rhizome	1,2, 3,4,5,6,7	H	Fr
	Kaempferia marginata Carey ex Roscoe (RPH 203)	pro pa	young shoots, rhizome	1,2, 3,5,6,7	H	Fr
	Zingiber montanum (J. Koenig) Link ex A. Dietr. (RPH 352)	phlai	flowers	1,2, 3,4,5,6,7	H	Cu

Table 4.20 Edible plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	* Ethnic group	**Plants habit	*** Source of plants
Zingiberaceae	*Zingiber officinale* Roscoe (RPH 353)	khing	rhizome	1,2, 3,4,5,6,7	H	Cu
	Zingiber ottensii Valeton (RPH 354)	phlai dam	rhizome	1,2, 3,4,5,6,7	H	Cu
	Zingiber zerumbet (L.) Roscoe ex Sm. subsp. *zerumbet* (RPH 355)	krathue	leaves, rhizome	1,4,5,6,	H	Cu

* 1 = Phu Thai , 2 = Kaleung, 3 = Kha, 4 = Sak , 5 = So, 6 = Yaw , 7 = Thai I –San

** H = Herb, T = Tree, ST = Shrubby tree, C = Climber, S = Shrub, S/ST = Shrub/Shrub tree, P = Palm, ScanS = Scandent Shrub, G = Grass, ST/T = Shrubby Tree/tree, US = Undershrub, CrH = Creeping Herb, HC = Herbaceous Climber, S/T = Shrub/Tree, WC = Woody Climber, AqH = Aquatic herb, B = Bamboo, CP = Climbing Palm limbing Palm, AqF = Aquatic Fern, EF = Epiphytic Fern, EO = Epiphytic Orchid, H/S = Herb/Shrub, H/ST = Herb / Shrubby Tree, PaHC = Parasitic Herbaceous Climber, PaS = Parasitic Shrub

*** Cu = cultivated, Fr = from the forest

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province.

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Acanthaceae	*Acanthus ebracteatus* Vahl(RPH 006)	ngueak pla mo	gastritis	whole parts	decoction	potions	2,4,5, 6,7	US	Cu
	Andrographis paniculata (Burm. f.) Wall. ex Nees (RPH 033)	fa thalai chon	diabetes, cough, flatulence, stomachache, fever, malaria, postpartum women	leaves	decoction, dried, cooked with chicken soup, freshly used	drink, ingest, chew	1,2,4, 5,6,7	H	Cu
	Barleria lupulina Lindl. (RPH 053)	salet phang phon	insect stings, pain, wound, pruritic rash	leaves	pounded	poultice, liniment	1,2,3, 4,5,6, 7	S	Cu
	Justicia gendarussa Burm. f. (RPH 201)	kraduk kai dam	diarrhoea, diuretic, fever,cough	whole parts	decoction	potions	1,2,3, 4,5,67	US	Cu
	Rhinacanthus nasutus (L.) Kurz (RPH 289)	thong phan sang	ringworm	leaves	pounded	poultice	1,3,4, 5,6,7	S	Cu
	Thunbergia laurifolia Lindl. (RPH 339)	rang chuet	insect stings	leaves	pounded	poultice	1,2,3, 4,5,67	C	fr
Amaranthaceae	*Achyranthes aspera* L. (RPH 007)	ya khoi ngu	cough	roots	pounded, grilled, and soaked in water	drink	1,4, 5,7	H	fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Amaranthaceae	*Celosia argentea* L. (RPH 085)	ngon kai	cough	roots	boiled in water	drink	1,3,4, 5,6,7	H	fr
Amaryllidaceae	*Allium ascalonicum* L. (RPH 017)	hom	cold	leaves	pounded and wrapped by white thin cloth	inhale	1,2, 3,4,5, 6,7	H	Cu
	Allium sativum L. (RPH 018)	kratiam	ringworm	leaves	pounded	liniment	1, 4,5	H	Cu
	Crinum asiaticum L. var. *asiaticum* (RPH 113)	wan son	ankle sprain, postpartum women, rotten wounds, bruises, pruritic rash	leaves	heated, pounded	plaster, poultice, liniment, placed under the mat	1,2, 3,4,5, 6,7	H	Cu
Anacardiaceae	*Mangifera indica* L. (RPH 222)	ma muang	dysentery, diarrhoea	bark	pounded, grilled and then soaked in water	drink	1,2,5, 6,7	T	Cu
Annonaceae	*Annona squamosa* L. (RPH 035)	noi na	louse	leaves	grinded	washing hair	1,2,3, 4,5,6, 7	S/ST	Cu

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Annonaceae	*Desmos chinensis* Lour. (RPH 136)	khruea khao klaep	muscle pain	roots	boiled in water	drink	1,2,7	C	Cu
	Goniothalamus laoticus (Finet & Gagnep.) Bân (RPH 177)	khao lam dong	tonic	stem	boiled in water	drink	1,2, 6,7	T	Fr
	Polyalthia evecta (Pierre) Finet & Gagnep. (RPH 282)	nom noi	galactagogue	roots	decoction	potions	1,2, 3,4,5, 6,7	S	Fr
	Uvaria rufa Blume (RPH 346)	nom khwai	pruritic rash, fever, galactagogue	roots, stem	pounded, boiled in water	liniment, drink	1,2,3, 4,5,6, 7	C	Fr
Apiaceae	*Anethum graveolens* L. (RPH 034)	phak chi lao	cold	whole parts	boiled in water	drink	1,3,4, 6,7	H	Cu
	Centella asiatica (L.) Urban. (RPH 086)	bua bok	aphthous ulcer,bruises	leaves	decoction, pounded	drink, liniment	1,2,3, 4,5,6, 7	C	Cu
Apocynaceae	*Aganonerion polymnorphum* Pierre ex Spire (RPH 013)	som lom	flatulence, pruritic rash,gastritis	roots	decoction, boiled in water	drink, bathe	1,2, 3,4,5, 6,7	C	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Apocynaceae	*Amphineurion marginatum (*Roxb.) D. J. Middleton (RPH 031)	mok khruea	tonic, diarrhoea, abscess	vines, leaves	decoction, pounded, grilled, soaked in water	drink , poultice	1,4,5, 6,7	C	Fr
	Cryptolepis dubia (Burm. f.) M. R. Almeida (RPH 117)	khruea en on	muscle pain	leaves, vines	pounded	herbal ball	1,2,3, 4,5,6, 7	C	Fr
	Dischidia nummularia R. Br. (RPH 151)	klet mangkon	wound	leaves	pounded	poultice	1, 4,5, 7	CrH	Fr
	Myriopteron extensum (Wight & Arn.) K. Schum. (RPH 247)	cha em	postpartum women	stems	decoction	potions	2,5,6, 7	C	Cu
Araceae	*Lasia spinosa* Thw. (RPH 210)	phak nam	waist pain	rhizome	decoction	drink	1,2,3	H	Fr
Arecaceae	*Areca catechu* L. (RPH 041)	mak	cough	seeds	pounded	liniment	1,2,3, 4,5,6, 7	P	Cu
	Borassus flabellifer L. (RPH 061)	tan	pruritic rash	inflorescence	decoction	steam bath	5,6	P	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Arecaceae	*Cocos nucifera* L. (RPH 102)	ma phrao	inflammation	roots	pounded	liniment	1,2,3, 4,5,6, 7	P	Cu
Asteraceae	*Blumea balsamifera* (L.) DC. (RPH 058)	nat	giddiness, pruritic rash, postpartum women, bruises	leaves, stems	decoction, heated	drink, bathe, plaster	1,2,3, 4,5,6, 7	S/ST	Fr
	Chromolaena odorata (L.) R. M. King & H. Rob. (RPH 090)	sap suea	haemostatic, flatulence	leaves	crushed, decoction	poultice, drink	1,2,3, 4,5,6, 7	H	Fr
	Elephantopus scaber L. var. *scaber* (RPH 156)	do mai ru lom	tonic,dysuria, Cough	roots	decoction	drink	1,2,3, 4,5,6, 7	H	Fr
	Gynura procumbens (Lour.) Merr. (RPH 179)	pae tam pueng	flatulence	leaves	non-prepared	chew	1,2, 4,5,6, 7	H	Cu
	Helianthus tuberosus L. (RPH 182)	than tawan hua	diabetes	roots	boiled in water	drink	1,3, 6,7	H	Cu
Bignoniaceae	*Crescentia cujete* L. (RPH 112)	namtao ton	postpartum women	stems	decoction	potions	2,4,5, 6,7	ST	Cu

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Bignoniaceae	*Millingtonia hortensis* L. f. (RPH 231)	pip	waist pain, cough, postpartum women	roots, stem	boiled in water, decoction, soaked in water	drink	1,2, 3,4,5, 6,7	T	Fr
	Oroxylum indicum (L.) Benth. ex Kurz (RPH 257)	pheka	diarrhoea	bark	soaked in water	drink	1,2, 3,4,5, 6,7	ST	Fr
Bromeliaceae	*Ananas comosus* (L.) Merr. (RPH 032)	sapparot	diuretic	leaves	decoction, pounded, grilled, and then squeezed	drink, liniment	1,2, 3,4,5, 6,7	H	Cu
Burseraceae	*Canarium subulatum* Guillaumin (RPH 074)	ma kok kluean	pruritic rash	gum	freshly used	potions	1, 3, 7	T	Fr
Capparidaceae	*Crateva adansonii* DC. subsp. *trifoliata* Jacobs (RPH 109)	phak kum	muscle pain,diarrhoea	leaves, bark	making apply a compress	apply a compress	1,2, 3,4,5, 6,7	T	Cu
Celastraceae	*Salacia chinensis* L. (RPH 294)	kam phaeng chet chan	flatulence	roots	boiled in water	drink	1,2, 5,6,7	ScanS	Fr
Chrysobalanaceae	*Parinari anamensis* Hance (RPH 265)	phok	bruised	bark	heated	apply a compress	1,2, 4,5,6	T	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Clusiaceae	*Garcinia cowa* Roxb. ex Choisy (RPH 168)	chamuang	postpartum women, beriberi, constipation	leaves, stems, fruits	boiled in water, soaked in water, non-prepared	bathe, drink, ingest	1,4,6, 7	T	Fr
Combretaceae	*Combretum quadrangulare* Kurz (RPH 106)	kae	diarrhoea	bark, leaves, young tops	pounded , decoction, boiled in water	liniment, drink	1,2,3, 4,5,6, 7	T	Fr
	Getonia floribunda Roxb. (RPH 171)	ting tang	venereal disease	roots	boiled in water	drink	1,2,4, 5,6	C	Fr
	Terminalia alata B. Heyne ex Roth (RPH 335)	rok fa (sueak)	wound	bark	soaked in water	bathe	1, 3,4, 6,7	T	Fr
	Terminalia catappa L. (RPH 336)	hu kwang	diarrhoea	bark, fruits	boiled in water	drink	1,2,5, 7	T	Cu
	Terminalia chebula Retz. var. *chebula* (RPH 337)	samo	diuretic, wound,constipation	bark, fruits	non-prepared, decoction, soaked in water	ingest, drink, bathe	1,2,3, 4,5,6, 7	T	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Connaraceae	*Roureopsis stenopetala* (Griff.) G. Schellenb. (RPH 292)	ma kham khruea	muscle pain	stems	boiled in water	drink	1,2, 5,6,7	C	Fr
Convolvulaceae	*Argyreia nervosa* (Burm. f.) Bojer (RPH 042)	phak rabat	diuretic, earache	roots, leaves	boiled in water, pounded	drink, poultice	1,2,4, 6	C	Fr
	Ipomoea cairica (L.) Sweet (RPH 196)	phak bung rua	cough	leaves	pounded	liniment	1,2,6, 7	HC	Fr
Costaceae	*Cheilocostus speciosus* (J. Koenig) C. D. Specht (RPH 089)	ueang mai na	diuretic	rhizome	boiled in water	drink	1,2,3, 4,5,6, 7	C	Cu
Cucurbitaceae	*Momordica cochinchinensis* (Lour.) Spreng. (RPH 237)	fak khao	fever	leaves, roots	decoction	potions	1,2,4, 6,7	HC	Cu
Cyperaceae	*Cyperus rotundus* L. (RPH 131)	ya haeo mu	tonic, hypertension, diuretic	roots	boiled in water, making bolus, dried and boiled in water	drink, ingest	1,2,3, 4,5,6, 7	H	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Dilleniaceae	*Dillenia ovata* Wall. ex Hook. f. & Thomson (RPH 138)	san	diarrhoea	bark	boiled in water, soaked in water	drink	2,6	T	Fr
Dioscoreaceae	*Dioscorea hispida* Dennst. (RPH 141)	kloi	inflammation	roots	sliced	poultice	1,2,3, 4,5,6, 7	HC	Fr
Dipterocarpaceae	*Dipterocarpus alatus* Roxb. ex G. Don (RPH 148)	yangna	inflammation, tonic	bark	boiled in water	drink	1,3,4, 5,7	T	Fr
	Dipterocarpus obtusifolius Teijsm. ex Miq. (RPH 149)	teng, sat	diarrhoea, pain	stem, bark	boiled in water,water form stems	drink	1,2,3, 4,5,6, 7	T	Fr
	Dipterocarpus tuberculatus Roxb. (RPH 150)	kung	diarrhoea	bark	pounded and soaked in water	drink	2,3,4, 5,6,7	T	Fr
	Hopea odorata Roxb. (RPH 189)	khaen	fever,cold	bark	soaked with water	drink	1,3,6	T	Fr
	Shorea obtusa Wall. ex Blume (RPH 307)	teng,chik	diarrhoea, pain, postpartum women	bark, stem	soaked in water, decoction	bathe, drink	1,2,3, 4,5,6, 7	T	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Dipterocarpaceae	*Shorea roxburghii G. Don* (RPH 308)	phayom	diarrhea, pruritic rash	bark	boiled in water	drink	1,2, 3,4,5, 6,7	T	Fr
	Shorea siamensis Miq. (RPH 309)	rung	diarrhoea	bark	boiled in water	drink	1,2, 3,4,5, 6,7	T	Fr
Ebenaceae	*Diospyros ehretioides* Wall. ex G. Don (RPH 143)	taptao ton	constipation	roots	decoction	drink	5,7	T	Fr
	Diospyros mollis Griff. (RPH 145)	ma kluea	anthelmintics	fruits	pounded with water	drink	1,2, 3,4,5, 6,7	T	Fr
	Diospyros Montana Roxb. (RPH 146)	ma kluea pa	postpartum women	bark	boiled in water	drink	1,2, 3,4,5, 6,7	H	Fr
	Diospyros rhodocalyx Kurz (RPH 147)	tako na	diarrhoea	fruits	decoction	potions	1,2,3, 4,5,6, 7	ST	Fr
Euphorbiaceae	*Croton argyratus* Blume (RPH 116)	plao	postpartum women, haemostatic, bruises, postpartum women	leaves, roots, gum	non-prepared, decoction , heated, soaked in water	drink, plaster, potions	1,2,3, 4,5,6, 7	ST	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Euphorbiaceae	*Euphorbia hirta* L. (RPH 160)	nam nom ratchasi	postpartum women	roots	boiled in water	drink	1,5,6, 7	H	Fr
	Euphorbia tirucalli L. (RPH 161)	phaya rai bai	hepatitis	shoots	decoction	potions	1,2,4, 5,7	S	Cu
	Ricinus communis L. (RPH 291)	la hung	constipation	leaves, roots	boiled in water	drink	1,2,3, 4,6,7	H	Cu
Fabaceae	*Acacia concinna* (Willd.) DC. (RPH 003)	som poi	postpartum women	fruits	boiled in water	bathe	1,2, 4,5,6	ScanS	Cu
	Adenanthera pavonina L. (RPH 010)	ma klam ton	sore throat, aphthous ulcer	roots	boiled in water	drink	1,4,5, 6,7	T	Cu
	Albizia lebbekoides (DC.) Benth. (RPH 014)	khang	abscess	roots	pounded	poultice	2,4,5, 6,7	T	Fr
	Albizia myriophylla Benth. (RPH 015)	cha aim pa	muscle pain	roots, stems	boiled in water	drink	1,3,4, 5	C	Fr
	Butea monosperma (Lam.) Taub. (RPH 066)	thong kwao	dysuria, abscess	flowers, leaves	pounded ,boiled in water	poultice, drink	1,2,3, 5,6,7	T	Fr
	Butea superba Roxb. (RPH 067)	kwao khruea	tonic	roots, stem	boiled in water	drink	1,2,3, 5,6,7	C	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Fabaceae	*Caesalpinia sappan* L. (RPH 069)	fang	tonic, postpartum women, conjunctivitis	stem	boiled in water, soaked in water	drink	1,2,4, 5,6,7	ST	Fr
	Cajanus cajan (L.) Millsp. (RPH 070)	thua rae	pruritic rash	leaves	boiled in water	steam bath	1,2,3, 4,6,7	S	Cu
	Cassia fistula L. (RPH 081)	khun	wound, constipation	stem, fruits	powdered, boiled in water	poultice, drink	1,2,3, 4,5,6, 7	T	Fr
	Clitoria ternatea L. (RPH 100)	anchan	diuretic	roots	grinded with water	drink	1,4,5, 6,7	C	Fr
	Crotalaria pallida Aiton (RPH 114)	hing men	diuretic	root	boiled in water	drink	4,5,7	H	Fr
	Crotalaria spectabilis Roth subsp. *parvibracteata* Niyomdham (RPH 115)	rang chuet	neutralize	stem	boiled in water	drink	1,2,3, 4,5,6, 7	US	Cu
	Dialium cochinchinense Pierre (RPH 137)	khleng	wound	bark	boiled in water	drink	2,5,6, 7	T	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Fabaceae	*Erythrina variegata* L. (RPH 159)	thong lang lai	abscess	leaves	pounded	poultice	1,2,4, 5	T	Cu
	Leucaena leucocephala (Lam.) de Wit (RPH 214)	kra thin thai	flatulence, wound, diabetes	roots, bark, seeds	decoction, pounded, freshly used	drink, liniment, ingest	1,4,5, 6,7	S/ST	Cu
	Lysiphyllum strychnifolium (Craib) A. Schmitz (RPH 219)	ya nang daeng	postpartum women, muscle pain, galactagogue	roots	decoction	drink	1,2,3, 4,5,6, 7	C	Fr
	Mimosa pudica L. (RPH 232)	maiyarap	diuretic	whole parts	dried, boiled in water	drink	1,2,3, 4,6,7	S	Fr
	Pithecellobium dulce (Roxb.) Benth. (RPH 279)	ma kham thet	canker, aphthous ulcer	bark	freshly used	mouth, poultice	1,2,4, 5	T	Cu
	Pterocarpus indicus Willd. (RPH 286)	kok du	postpartum women, abscess	bark,leaves	decoction, pounded	drink, poultice	1,2,3, 4,5,6, 7	T	Cu
	Senna alata (L.) Roxb. (RPH 301)	sumhet thet	ring worm	leaves	pounded, decoction	poultice, potions	1,2,3, 4,5,6, 7	S	Fr
	Senna siamea (Lam.) H. S. Irwin & Barneby (RPH 302)	kee lek	waist pain, constipation	stem	boiled in water, decoction	drink	1,2,3, 4,5,6, 7	T	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Fabaceae	*Senna tora* (L.) Roxb. (RPH 303)	sumhet thai	ringworm	leaves	pounded	poultice	1,4,5, 6,7	US	Fr
	Sesbania grandiflora (L.) Poir. (RPH 305)	khae	aphthous ulcer, ringworm, diarrhoea	bark	freshly used, pounded, pounded, soaked in water	mouth, poultice, drink	1,2,3, 4,5,6, 7	ST	Cu
	Sindora siamensis Teijsm. ex Miq. var. *siamensis* (RPH 311)	makha tae	postpartum women	bark	boiled in water	bathe	2,4,5, 6,7	T	Fr
	Tamarindus indica L. (RPH 332)	ma kham	postpartum women	stem, leaves	decoction	drink	1,2,3, 4,5,6, 7	T	Cu
	Uraria crinita (L.) Desv. ex DC. (RPH 345)	hang ma chok	canker (animal)	roots	pounded	poultice	1,2,7	US	Fr
	Xylia xylocarpa (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen (RPH 350)	daeng	postpartum women, muscle pain,blood tonic	stem, bark	boiled in water, decoction, soaked in water	drink, bathe	1,2,3, 4,5,6, 7	T	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Fabaceae	*Bauhinia malabarica* Roxb. (RPH 056)	som siao	muscle pain, pruritic rash	roots, leaves	boiled in water, soaked in water	drink, bathe	1,2,3, 4,7	T	Fr
Fagaceae	*Castanopsis piriformis* Hickel & A. Camus (RPH 082)	ko hin	dysuria	roots	boiled in water	drink	1,2,4, 5,6	T	Fr
Gentianaceae	*Fagraea fragrans* Roxb. (RPH 162)	kan krao	wound, fever, tonic	leaves, stem	pounded , boiled in water	poultice, drink	2,4,5, 6,7	T	Fr
Gnetaceae	*Gnetum macrostachyum* Hook. f. (RPH 175)	mueai duk	muscle pain	stems	soaked in water	drink	1,2,6, 7	C	Fr
Hypericaceae	*Cratoxylum cochinchinense* (Lour.) Blume (RPH 110)	tio	flatulence	young shoots	boiled in water	drink	1,2,3, 4,5,6, 7	T	Fr
	Cratoxylum formosum (Jacq.) Benth. & Hook. f. ex Dyer subsp.*Pruniflorum* (Kurz) Gogelein (RPH 111)	tio som	cracked heel, wound	gum	freshly used	apply to skin	1,2,5, 6,7	T	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Irvingiaceae	*Irvingia malayana* Oliv. ex A. W. Benn. (RPH 197)	krabok	knee pain, pruritic rash	stem, seeds, leaves	boiled in water, roast	drink, ingest	1,2,4, 5	T	Fr
Lamiaceae	*Tectona grandis* L. f. (RPH 333)	sak	diuretic	flowers	boiled in water	drink	1,2,4, 5	T	Cu
	Clerodendrum paniculatum L. (RPH 099)	phuang phi dang	diuretic, flatulence, ear ache	roots, leaves	dried, boiled in water, decoction, pounded , squeezed	potions	1,2,4, 6,7	S	Fr
	Mentha cordifolia Opiz ex Fresen ex Fresen (RPH 229)	saranae	diarrhoea	leaves	pounded	liniment	1,2,3, 4,5,6, 7	H	Cu
	Ocimum africanum Lour. (RPH 254)	maeng lak	flatulence	leaves	grated	liniment	1,2,3, 4,5,6, 7	H	Cu
	Ocimum basilicum L. (RPH 255)	horapha	flatulence	leaves	fresh ,boiled in water	drink, ingest	1,2,3, 4,5,6, 7	US	Cu
	Ocimum tenuiflorum L. (RPH 256)	kraphao	flatulence, abscess	leaves	boiled in water	drink	1,2,3, 4,5,6, 7	US	Cu

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Lamiaceae	*Orthosiphon aristatus* (Blume) Miq. (RPH 258)	ya nuat maeo	muscle pain,diabetes, diuretic	whole parts	boiled in water	drink	1,2,4, 6,7	H	Fr
	Plectranthus amboinicus (Lour.) Spreng. (RPH 280)	hu suea	cold, flatulence, ear ache	leaves, seeds	pounded	liniment	1,4,5, 6,7	H	Cu
Lauraceae	*Litsea glutinosa* (Lour.) C. B. Rob. (RPH 217)	mi	muscle pain,abscess	roots, seeds	boiled in water, pounded	drink, poultice	1,2,4, 5,7	T	Fr
Lecythidaceae	*Careya arborea* Roxb. (RPH 078)	kradon	wound, galactagogue, diarrhoea, gastritis	leaves, roots, flower, bark	pounded, boiled in water, decoction	liniment ,drink	2,4,5, 6,7	T	Fr
Loganiaceae	*Strychnos nux-vomica* L. (RPH 323)	salaeng chai	cough, abscess, malaria	roots, seeds	grinded, boiled in water	apply to skin, drink	1,2,3, 4,5	ST	Fr
Loranthaceae	*Dendrophthoe pentandra* (L.) Miq. (RPH 135)	ka fa ma mong	hypertension	shoots, leaves	decoction	potions	1,4,5, 6,7	PaS	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Lythraceae	*Lagerstroemia speciosa* (L.) Pers. (RPH 209)	inthanin bok	diarrhoea, diabetes, dysuria	bark, leaves, stem	pounded, grilled, soaked in water, dried, boiled in water	drink	2,4,5, 7	T	Fr
	Punica granatum L. var. *granatum* (RPH 287)	thapthim	dysentery, diarrhoea	leaves, fruits, stem	boiled in water, grilled, soaked in water	drink	1,2,4, 5,6,7	S	Cu
Malvaceae	*Abelmoschus esculentus* (L.) Moench (RPH 001)	krachiap	cough, tonic	fruits, seeds	decoction	potions	1,2,3, 4,5,6, 7	S	Cu
	Corchorus aestuans L. (RPH 107)	krachao na	cough,fever	leaves, seeds	decoction	potions	2,4	H	Cu
	Gossypium herbaceum L. (RPH 178)	fai	kidney stones	seeds	boiled in water	drink	1,2,4, 5,6,7	S	Cu
	Helicteres angustifolia L. (RPH 183)	khi tun	muscle pain	whole parts	boiled in water	drink	2,4,5, 6,7	S	Cu
	Helicteres hirsute Lour. (RPH 184)	po tao hai	wound, muscle pain	leaves, whole parts	pounded, boiled in water	poultice, drink	2,4,5, 6,7	ScanS	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Malvaceae	*Helicteres isora* L. (RPH 185)	po bit	diarrhoea	fruits	boiled in water	drink	1,2,4, 5,6,7	S	Fr
	Microcos tomentosa Sm. (RPH 230)	phlap phla	asthma, constipation	stems, fruits	decoction, non-prepared	potions, ingest	1,6	T	Fr
	Sida rhombifolia L. subsp. *Rhombifolia* (RPH 310)	ya khat	roots	toothache	pounded	mouth	1,2,4, 7	US	Fr
Melastomataceae	*Memecylon edule* Roxb. (RPH 228)	phlong mueat	gastritis	stems	boiled in water	drink	1,2,4, 5,6,7	S/ST	Fr
Meliaceae	*Azadirachta indica* A. Juss. (RPH 049)	sadao	fever	bark, roots	boiled in water	drink	1,2,3, 4,5,6, 7	T	Cu
	Sandoricum koetjape (Burm. f.) Merr. (RPH 295)	kraton	ringworm	bark	pounded	liniment	1,2,3, 4, 6,7	T	Cu
Menispermaceae	*Cissampelos pareira* L. var. *hirsuta* (Buch. ex DC.) Forman (RPH 092)	krung kha mao	fever	roots	soaked in water	drink	1,2,5, 6,7	C	Fr
	Tiliacora triandra (Colebr.) Diels (RPH 341)	thao ya nang	wound, muscle pain, cold	leaves, roots	boiled in water	poultice, drink	1,2,4, 5,6,7	C	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Menispermaceae	*Tinospora crispa* (L.) Hook. f. & Thomson (RPH 342)	bora phet	diabetes, tonic	vines	freshly used	ingest	1,2,3, 4,5,6, 7	C	Fr
Moraceae	*Artocarpus heterophyllus* Lam. (RPH 044)	khanun	flatulence	leaves	decoction	drink	1,2,4, 6,7	T	Cu
	Artocarpus lacucha Roxb. ex Buch.-Ham. (RPH 045)	ma hat	pruritic rash, flatulence	stems	grinded, boiled in water	liniment, drink	2,4,5	T	Cu
	Morus alba L. (RPH 242)	mon	cough	leaves	decoction	drink	1,2,3, 6,7	ST	Cu
Moringaceae	*Moringa oleifera* Lam.(RPH 241)	ma rum	diabetes, hypertension	roots, fruits, leaves	decoction	drink	1,2,3, 4,5,6, 7	ST	Cu
Muntingiaceae	*Muntingia calabura* L. (RPH 243)	ta khop farang	constipation	bark	boiled in water	drink	1,2,3, 4,5,6, 7	ST	Cu
Musaceae	*Musa* × *paradisiaca* L. (RPH 244)	kluai namwa	diarrhoea	fruits	slices, dried ,boiled in water	drink	1,2,3, 4,5,6, 7	H	Cu
	Musa balbisiana Colla (RPH 245)	kluai tani	diarrhoea	peel	dried, boiled in water	drink	1,2,3, 4,5,6, 7	H	Cu

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Musaceae	*Musa ornata* Roxb. (RPH 246)	kluai bua	diarrhoea	roots, flowers, fruits	decoction	potions	1,2,4, 7	H	Cu
Myrtaceae	*Psidium guajava* L. (RPH 284)	farang	halitosis, flatulence, diarrhoea	bark, leaves	non-prepared, decoction, pounded and soaked in water	chew, drink	1,2,4, 5,6,7	ST	Cu
	Rhodamnia dumetorum (DC.) Merr. & L. M. Perry (RPH 290)	kon thuai	fever	roots	boiled in water	drink	2,5,6	S	Fr
	Syzygium cinereum (Kurz) Chantar. & J. Parn. (RPH 327)	wa	aphthous ulcer	bark	freshly used	mouth	1,2,3, 5,6,7	T	Fr
	Syzygium antisepticum (Blume) Merr. & L. M. Perry (RPH 326)	samet chun	flatulence	leaves, young tops	non-prepared	ingest	1,2,3, 4,5,6, 7	ST/T	Fr
Oleaceae	*Jasminum anodontum* Gagnep. (RPH 199)	sai kai	muscle pain	roots	boiled in water	drink	1,2,4, 7	C	Fr
Orchidaceae	*Cymbidium aloifolium* (L.) Sw. (RPH 127)	mai ka dam pi	ear ache	leaves	heated	dropped water to ear	1,2,6	EO	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Oxalidaceae	*Averrhoa carambola* L. (RPH 048)	ma ferng	postpartum women	stem	decoction	drink	1,2,3, 4,5,7	ST	Cu
Pandanaceae	*Pandanus amaryllifolius* Roxb. (RPH 263)	toei	muscle pain, diabetes, hypertension	leaves	decoction	drink	1,2,3, 4,5,6, 7	S	Cu
Pedaliaceae	*Sesamum indicum* L. (RPH 304)	nga	burn,scald, wound	seeds	pounded and squeezed oil from seeds	apply to skin	1,2,3, 4,5,6, 7	H	Cu
Phyllanthaceae	*Antidesma ghaesembilla* Gaertn. (RPH 037)	mao khai pla	muscle pain	bark, leaves	making apply a compress	apply a compress	2,6,7	S/T	Fr
	Baccaurea ramiflora Lour.(RPH 050)	ma fai	waist pain	stem leaves	boiled in water	drink	1,2,3, 4,5,6, 7	T	Fr
	Phyllanthus acidus (L.) Skeels (RPH 272)	ma yom	fever	bark	boiled in water	drink	1,2,3, 4,5,6	ST	Cu
	Phyllanthus emblica L. (RPH 273)	ma kham pom	cough, cold, constipation, dentalgia	fruits	non-prepared	ingest	1,2,3, 4,5,6, 7	ST/T	Fr
	Phyllanthus virgatus G. Forst. (RPH 274)	ma ter ber	kidney disease, fever	whole parts	dried, boiled in water	drink	1,2,4, 5,6,7	H	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Piperaceae	*Piper betle* L. (RPH 275)	phu	hypermenorrhoe, pruritic rash	vines, leaves	boiled in water, pounded with local whisky	drink, poultice	1,2,3, 4,5,6, 7	WC	Cu
	Piper rostratum Roxb. (RPH 278)	cha plu	dentalgia, flatulence	leaves	pounded together with salt, non-prepared	poultice tooth, ingest	1,2,3, 4,5,6, 7	CrH	Cu
Poaceae	*Centotheca lappacea* (L.) Desv. (RPH 087)	khon moi mae mai	postpartum women	whole parts	boiled in water	drink	1,2,3, 4,5,6, 7	G	Fr
	Cymbopogon citratus (DC.) Stapf (RPH 128)	ta khrai	muscle pain, flatulence, aphthous ulcer, cold, hypertension	leaves, stem	making apply a compress, boiled in water, decoction	apply a compress, drink, ingest	1,2,3, 4,5,6, 7	G	Cu
	Cymbopogon nardus (L.) Rendle (RPH 129)	ta khrai hom	muscle pain, flatulence, aphthous ulcer, cold, hypertension	leaves, stem	making apply a compress, boiled in water, decoction	apply a compress, drink, ingest	1,2,3, 4,5,6, 7	G	Cu

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Poaceae	*Imperata cylindrical* (L.) Raeusch. (RPH 192)	ya kha	flatulence	roots	decoction	potions	1,5,7	G	Fr
	Saccharum officinaru L. (RPH 293)	oi	diuretic, postpartum women	stem	boiled in water, decoction	drink	1,2,3, 4,5,6, 7	G	Cu
Polypodiaceae	*Drynaria quercifolia* (L.) Sm. (RPH 154)	kratae tai mai	diuretic, wound	leaves, roots	decoction, pounded	potions, poultice	2,4,5	EF	Fr
	Homalocladium platycladum (F. Muell.) L. H. Bailey (RPH 188)	ta khap hin	insect stings	leaves	pounded with lemonade	poultice	1,2,4, 5,6,7	S	Cu
Primulaceae	*Ardisia pilosa* H. R. Fletcher (RPH 040)	phuang tum hu	fever,cough	roots, leaves	boiled in water	drink	4, 6	S	Fr
Rhamnaceae	*Ziziphus cambodiana* Pierre (RPH 356)	nam khom	diarrhoea	bark	soaked in water	drink	2,5,7	ST	Fr
	Ziziphus jujuba Mill. (RPH 357)	ma ka tan	leukorrhea	bark	boiled in water	drink	1,2,3, 4,5,6, 7	ST	Cu
	Ziziphus oenoplia (L.) Mill. var. *oenoplia* (RPH 358)	lep yiao	leukorrhea	roots	boiled in water	drink	1,2,5, 6,7	C	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Rhizophoraceae	*Carallia brachiate* (Lour.) Merr. (RPH 077)	chiang phra nang ae	fever	stem, bark	boiled in water	bathe	4, 7	T	Fr
Rubiaceae	*Gardenia obtusifolia* Roxb. ex Hook. f. (RPH 170)	kham mok luang	cough,postpartum women	stems	decoction, boiled in water	potions, bathe	1,2, 4, 6	S/ST	Fr
	Mitragyna diversifolia (Wall. ex G. Don) Havil. (RPH 234)	kra thum na	hypertension	leaves	boiled in water	drink	2,5,6	ST	Fr
	Morinda corei Buch.-Ham. (RPH 240)	yo pa	louse,tonic	leaves, stems	pounded , boiled in water	poultice, drink	1,2,3, 4,5,6, 7	ST	Fr
	Oxyceros horridus Lour. (RPH 260)	khat khao	fever	roots, stem	grinded with water	drink	1,4,7	ScanS	Fr
Rutaceae	*Aegle marmelos* (L.) Corrêa ex Roxb. (RPH 011)	ma tum	flatulence, abscess	fruits, roots	boiled in water, grinded	drink, apply to skin	1,2,4, 5,6,7	T	Fr
	Citrus × *aurantifolia* (Christm.) Swingle (RPH 094)	ma nao	cough, sore throat, insect stings	lemonade, bark, roots	freshly used, decoction, grinded	drink, liniment	1,2,4, 6,7	ST	Cu
	Clausena guillauminii Tanaka (RPH 097)	song fa	headache	roots	boiled in water	drink	2,4,5, 6,7	S	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Salicaceae	*Casearia grewiifolia* Vent. (RPH 080)	pha sam	postpartum women	stem	boiled in water	drink	1,2,5, 6,7	T	Fr
	Flacourtia indica indica (Burm. f.) Merr. (RPH 167)	ta khop pa	muscle pain	stem	boiled in water	drink	1,4,5, 7	S/ST	Fr
Santalaceae	*Scleropyrum pentandrum* (Dennst.) Mabb. (RPH 300)	nom ngo	galactagogue, tonic	stems, roots	decoction	potions	1,2,4, 6,7	T	Fr
Sapindaceae	*Lepisanthes rubiginosa* (Roxb.) Leenh. (RPH 213)	ma huat	pruritic rash	roots	pounded	poultice	1,2,4, 5,7	S/ST	Fr
Sapotaceae	*Mimusops elengi* L. (RPH 233)	phikun	blood tonic, periodontitis	stems, bark	decoction, freshly used	potions, mouth	2,5,6, 7	T	Cu
Saururaceae	*Houttuynia cordata* Thunb. (RPH 190)	phak khao thong	diuretic	whole parts	pounded with water	drink	1,2,4, 5,6,7	H	Cu
Simaroubaceae	*Brucea javanica* (L.) Merr. (RPH 064)	rat cha dat	flatulence	bark	boiled in water	drink	4,7	S/ST	Fr
Smilacaceae	*Smilax glabra* Roxb. (RPH 312)	ya ho	galactagogue	rhizome	decoction	potions	1,2,5, 6,7	C	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Solanaceae	*Solanum anguivi* Lam. (RPH 313)	ma waeng	cough,diuretic	fruits, roots	pounded and squeeze, decoction	drink, potions	1,2,3, 4,5,6, 7	S	Cu
	Solanum incanum L. (RPH 314)	ma khuea khuen	cough	roots	soaked in water	drink	1,2,3, 4,5,6, 7	S	Cu
Vitaceae	*Leea thorelii* Gagnep. (RPH 212)	katang bai tia	fever	roots	boiled in water	drink	4, 7	H/S	Fr
Xanthorrhoeaceae	*Aloe vera* (L.) Burm. f. (RPH 021)	wan hang chora khe	burn, haemostatic, gastritis	leaves	peeled off	plaster, ingest	1,2,3, 4,5,6, 7	H	Cu
Xyridaceae	*Xyris indica* L. (RPH 351)	ya khi klak	tonic, ringworm	whole parts	decoction, pounded	potions, poultic	1,2,3, 4	H	Fr
Zingiberaceae	*Alpinia zerumbet* (RPH 025)	kha	Stomachache, flatulence	rhizome	non-prepared	ingest	1,2,3, 4,5,6, 7	H	Cu

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Zingiberaceae	*Alpinia galanga* (L.) Willd. (RPH 023)	kha	dysuria, ringworm, muscle pain, flatulence, gastritis, beriberi	rhizome	non-prepared, pounded, decoction, slices, dried, and boiled in water, pounded with water	ingest, liniment, drink	1,2,3, 4,5,6, 7	H	Cu
	Curcuma comosa Roxb. (RPH 120)	wan shak mod look	postpartum women	rhizome	non-prepared dried or powdered, hot infusion, decoction	ingest, powders, drink, bathe	1,2,3, 4,5,6, 7	H	Cu
	Curcuma longa L. (RPH 121)	khamin chan	gastritis, insect stings, pruritic rash, flatulence, ringworm	rhizome	non-prepared, pounded, sliced, and dried then mixed with honey as a bolus	ingest, poultice, liniment, poultice	1,2,3, 4,5,6, 7	H	Cu

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Zingiberaceae	*Curcuma manga* Valeton & Zijp (RPH 122)	khamin khao	flatulence	rhizome	boiled in water	drink	1,2,3, 4,6,7	H	Cu
	Curcuma parviflora Wall. (RPH 123)	krachiao khao	wound	leaves	pounded	poultice	1,2,5, 6,7	H	Fr
	Curcuma sessilis Gage (RPH 124)	krachiao dang	pruritic rash	rhizome	pounded	liniment	1,2,4, 5,6	H	Cu
	Curcuma zedoaria (Christm.) Roscoe (RPH 125)	khi min	gastritis, stomachache, ankle sprain	rhizome	dried or powdered, finely chopped or cooked with eggs, pounded with alcohol	drink, ingest, poultice	1,2,3, 4,5,6, 7	H	Cu
	Globba winitii C. H. Wright (RPH 174)	wan sao long	waist pain	shoots	cooked with chicken soup	ingest	4,5,6, 7	H	Cu
	Kaempferia marginata Carey ex Roscoe (RPH 203)	pro pa	blood tonic, gastritis, diarrhoea, stomachache, bruises,wound	rhizome	non-prepared, pounded, chopped or mix with ash, heated	ingest, drink, liniment, poultice	1,2,4, 5,6,7	H	Fr

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
Zingiberaceae	*Kaempferia parviflora* Wall. ex Baker (RPH 204)	khra chai dam	tonic, gastritis, bloody stool, cough, stomachache	rhizome	mixed with alcohol, decoction, cooked with eggs	drink, ingest	1,2, 3,4,5, 6,7	H	Cu
	Zingiber montanum (J. Koenig) Link ex A. Dietr. (RPH 352)	phlai	diarrhoea, stomachache, flatulence,col, fever, anthelmintics, pruritic rash, muscle pain	rhizome	non-prepared, pounded, pulped, decoction	ingest, poultice, liniment, bathe	1,2,3, 4,5,6, 7	H	Cu
	Zingiber officinale Roscoe (RPH 353)	khing	cough, sore throat, flatulence	rhizome	decoction , pounded, heated, sliced, dried, boiled in water	drink, poultice over neck	1,2,3, 4,5,6, 7	H	Cu
	Zingiber ottensii Valeton (RPH 354)	phlai dam	gastritis, stomachache, flatulence, bloody stool, constipation,	rhizome	dried, powdered, decoction, sharpened, pounded	powders, drink, inserted in anus, poultice	1,3,4, 5,6,7	H	Cu

Table 4.21 Medicinal plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Illness	Plant part used	Mode of Preparation	Mode of administration	* Ethnic group	** Plants habit	*** Source of plants
			waist pain						
Zingiberaceae	*Zingiber zerumbet* (L.) Roscoe ex Sm. subsp. *Zerumbet* (RPH 355)	krathue	flatulence	rhizome	decoction	drink	1,2,3, 4,5,6, 7	H	Cu

* 1 = Phu Thai , 2 = Kaleung, 3 = Kha, 4 = Sak , 5 = So, 6 = Yaw , 7 = Thai I –San

** H = Herb, T = Tree, ST = Shrubby tree, C = Climber, S = Shrub, S/ST = Shrub/Shrub tree, P = Palm, ScanS = Scandent Shrub, G = Grass, ST/T = Shrubby Tree/tree, US = Undershrub, CrH = Creeping Herb, HC = Herbaceous Climber, S/T = Shrub/Tree, WC = Woody Climber, AqH = Aquatic herb, B = Bamboo, CP = Climbing Palm limbing Palm, AqF = Aquatic Fern, EF = Epiphytic Fern, EO = Epiphytic Orchid, H/S = Herb/Shrub, H/ST = Herb / Shrubby Tree, PaHC = Parasitic Herbaceous Climber, PaS = Parasitic Shrub

*** Cu = cultivated, Fr = from the forest

Table 4.22 Cultural plants of the ethnic groups in Nakhon Phanom province

Family	Scientific name	Local name	Plant parts used	Cultural usage	* Ethnic group	**Plants habit	*** Source of plants
Amaranthaceae	*Gomphrena globosa* L. (RPH 176)	ban mai ru roi	flowers	worship, ornamentation of Bai si	1,2,3,4, 6,7	H	Cu
Amaryllidaceae	*Allium ascalonicum* L. (RPH 017)	hom	bulb, leaves	worship for joa pu	1, 4,5,6	H	Cu
	Crinum asiaticum L. var. *asiaticum* (RPH 113)	wan son	leaves	ornamentation in funeral	1,2,3,4,5,6,7	H	Cu
Annonaceae	*Cananga odorata* (Lam.) Hook. f. & Thomson var. *odorata* (RPH 073)	kradang nga	leaves	used in rituals	2,5,6,7	T	Cu
Apiaceae	*Coriandrum sativum* L. (RPH 108)	phak chi	whole parts	worship for joa pu	1,2,4,5,6	H	Cu
Apocynaceae	*Calotropis gigantea* (L.) W. T. Aiton (RPH 072)	rak	flowers	worship, ornamentation of Bai si, use in Yao ceremony	1,2,3,4,5,6,7	S/ST	Fr
	Plumeria obtusa L. (RPH 281)	lun tom	flowers	worship, ornamentation of Bai si, use in Yao ceremony	1,2,3,4,5,6,7	ST	Cu
	Tabernaemontana pandacaqui Lam. (RPH 329)	put	flowers	worship, ornamentation of Bai si	1,2,3,4,5,6,7	ST	Cu
	Thevetia peruviana (Pers.) K. Schum. (RPH 338)	ram phoei	flowers	worship	1,2,3,4,5,6,7	ST	Cu

Table 4.22 Cultural plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	Cultural usage	* Ethnic group	**Plants habit	*** Source of plants
Araceae	*Alocasia macrorrhizos* (L.) G. Don (RPH 020)	kradad	whole parts	eliminate evil	1,4,5,6	H	Cu
Arecaceae	*Areca catechu* L. (RPH 041)	mak	fruits	used in rituals	1,2,3,4,5,6,7	P	Cu
	Cocos nucifera L. (RPH 102)	ma phrao	fruits, leaves, petiole,coconut juice	used in rituals, use in funeral	1,2,3,4,5,6,7	P	Cu
Asteraceae	*Blumea balsamifera* (L.) DC. (RPH 058)	nat	leaves	eliminate evil	1,2,3,4,5,6,7	S/ST	Fr
	Lactuca sativa L. (RPH 206)	phak kat hom	leaves	worship for joa pu	4,5,6	H	Cu
	Tagetes erecta L. (RPH 331)	dao rueang	flowers	worship, ornamentation of Bai si, use in Yao ceremony	1,2,3,4,5,6,7	H	Cu
Brassicaceae	*Brassica oleracea* L. Group *Capitata* (RPH 063)	kalam pli	whole parts	worship for joa pu	2	H	Cu
Caricaceae	*Carica papaya* L. (RPH 079)	mala kho	leaves ,fruits	use in Yao ceremony,used for candle ceremony	1,2,3,4,5,6,7	ST	Cu
Combretaceae	*Getonia floribunda* Roxb. (RPH 171)	ting tang	flowers	used in rituals (So)	4,5,6,7	C	Fr
Cucurbitaceae	*Benincasa hispida* (Thunb.) Cogn. (RPH 057)	fak	fruits	used in rituals (boon ka tin)	1,2,4,5,6,7	HC	Cu

Table 4.22 Cultural plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	Cultural usage	* Ethnic group	**Plants habit	*** Source of plants
Cucurbitaceae	*Cucumis melo* L. (RPH 118)	taeng thai	fruits	used in rituals (boon ka tin)	1,2,3,4,5,6,7	HC	Cu
	Cucurbita moschata Duchesne(RPH 119)	fak thong	fruits	used in rituals (boon ka tin)	1,2,3,4,5,6,7	HC	Cu
Dioscoreaceae	*Dioscorea hispida* Dennst. (RPH 141)	kloi	roots	used in rituals	1,2,4,5,6,7	HC	Fr
Dipterocarpaceae	*Dipterocarpus obtusifolius* Teijsm. ex Miq. (RPH 149)	teng, sat	stem	charcoal used in rituals (boon kao ji)	1,4,5,6	T	Fr
	Shorea siamensis Miq. (RPH 309)	rung	flowers	used in rituals	1,3,4,5,6	T	Fr
Fabaceae	*Acacia catechu* (L. f.) Willd. (RPH 002)	si siad	bark	used in rituals	1,2,3,4,5,6,7	T	Cu
	Acacia concinna (Willd.) DC. (RPH 003)	som poi	fruits	used in rituals	1,2,3,4,5,6,7	ScanS	Cu
	Butea monosperma (Lam.) Taub. (RPH 066)	thong kwao	flowers	used in rituals	4,5,6	T	Fr
	Cassia fistula L. (RPH 081)	khun	flowers, leaves, stem	used in rituals	1,2,3,4,5,6,7	T	Cu

Table 4.22 Cultural plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	Cultural usage	* Ethnic group	**Plants habit	*** Source of plants
Fabaceae	*Vigna unguiculata* (L.) Walp. subsp. *unguiculata* (RPH 347)	thua dam	fruits	used in weddings	1,2,3,4,5,6,7	HC	Cu
	Pterocarpus indicus Willd. (RPH 286)	kok du	stem	charcoal used in rituals (boon kao ji)	2,4,5,6	T	Cu
	Xylia xylocarpa (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen (RPH 350)	dang	stem	charcoal used in rituals (boon kao ji)	1,2,4,5,6,7	T	Fr
Loganiaceae	*Strychnos nux-vomica* L. (RPH 323)	salaeng chai	fruits	used to contain coconut oil in ok pan sa ceremony	1,2	ST	Fr
Lythraceae	*Punica granatum* L. var. *granatum* (RPH 287)	thapthim	leaves	keep a pocket of time to speculate	1,3,4, 6,7	S	Cu
Malvaceae	*Gossypium herbaceum* L. (RPH 178)	fai	fiber	holy thread	1,2,3,4,5,6,7	S	Cu
	Hibiscus rosa-sinensis L. (RPH 186)	cha ba	flowers	used in rituals	1,2,3,4,5,6,7	S/ST	Cu
Meliaceae	*Azadirachta indica*A. Juss. (RPH 049)	sadao	young tops, inflorescence	worship for joa pu	1,2	T	Cu

Table 4.22 Cultural plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	Cultural usage	* Ethnic group	**Plants habit	*** Source of plants
Moraceae	*Artocarpus heterophyllus* Lam. (RPH 044)	khanun	leaves	wrapped in the ritual of the Yao	1,2,3,4,5,6,7	T	Cu
Moringaceae	*Moringa oleifera* Lam. (RPH 241)	ma rum	leaves	keep a pocket of time to speculate	1	ST	Cu
Musaceae	*Musa balbisiana* Colla (RPH 245)	kluai tani	leaves,whole parts, fruits	used in rituals,used in weddings,used in funerals used in weddings,ordinate ceremony	1,2,3,4,5,6,7	H	Cu
	Musa × *paradisiaca* L. (RPH 244)	kluai namwa	whole parts	used in rituals,used in weddings,used in funerals used in weddings,ordinate ceremony	1,2,3,4,5,6,7	H	Cu
Nelumbonaceae	*Nelumbo nucifera* Gaertn. (RPH 248)	bua luang	flowers,leaves	used in rituals,worship,ordinate ceremony	1,2,3,4,5,6,7	AqH	Cu
Oleaceae	*Jasminum sambac* (L.) Aiton (RPH 200)	ma li	flowers,leaves	worship	1,2,3,4,5,6,7	C	Cu
Oxalidaceae	*Averrhoa carambola* L. (RPH 048)	ma fueang	fruits	used for candle ceremony	1,2,3,4,5, 7	ST	Cu

Table 4.22 Cultural plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	Cultural usage	* Ethnic group	**Plants habit	*** Source of plants
Pandanaceae	*Pandanus kaida* Kurz (RPH 264)	toei san suea	leaves	made mat used in rituals	1,5	S/ST	Fr
Pedaliaceae	*Sesamum indicum* L. (RPH 304)	nga	seeds	used in weddings	1,2,3,4,5,6,7	H	Cu
Phyllanthaceae	*Phyllanthus acidus* (L.) Skeels (RPH 272)	Ma yom	leaves,petiole	sprinkled holy water	1,2,3,4,5,6,7	ST	Cu
Piperaceae	*Piper betle* L. (RPH 275)	phlu	leaves	used in rituals	1,2, 3,4,5,6,7	WC	Cu
Poaceae	*Bambusa nutans* Wall. ex Munro (RPH 052)	phai bong	stem	used in rituals,used in song krans ceremony (bung ja reed)	1,2,3,4,5,6,7	B	Cu
	Cynodon dactylon (L.) Pers. (RPH 130)	ya phraek	whole parts	used in weddings(sak)	1,2	G	Fr
	Oryza sativa L. (RPH 259)	khao	seeds	used in rituals,used in weddings	1,2,3,4,5,6,7	G	Cu
	Saccharum officinarum L. (RPH 293)	oi	whole parts	used in rituals,used in weddings	1,2,3,4,5,6,7	G	Cu
Rubiaceae	*Ixora cambodiana* Pit. (RPH 198)	khem	flowers	worship	1,2,3,4,5,6,7	S	Cu
	Morinda citrifolia L. (RPH 239)	yo ban	leaves,stem	used in rituals,used in song krans ceremony	1,2,3,4,5,6,7	ST	Cu

Table 4.22 Cultural plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	Cultural usage	* Ethnic group	**Plants habit	*** Source of plants
Rubiaceae	*Neolamarckia cadamba* (Roxb.) Bosser (RPH 249)	kra tum pai	leaves	embroidered on the front door to guard against evil	1,2,5,6,7	T	Fr
Rubiaceae	*Oxyceros horridus* Lour. (RPH 260)	khat khao	flowers	adorned head of the woman who do Yao ceremony	1	ScanS	Fr
Sapindaceae	*Dimocarpus longan* Lour. var. *longan* (RPH 139)	lum yai	leaves	keep a pocket of time to speculate	1	T	Cu
Solanaceae	*Capsicum annuum* L. (RPH 076)	phrik	fruits	used in rituals,used in weddings,used in boon koa sak	1,2,3,4,5,6,7	US	Cu
	Nicotiana tabacum L. (RPH 252)	ya sub	leaves	used in rituals	1,2,3,4,5,6,7	H	Cu
	Solanum melongena L. (RPH 316)	ma khuea yao	fruits	used in rituals,used in weddings,used in boon koa sak,worship for joa pu	1,6	US	Cu
Zingiberaceae	*Hedychium coronarium* (RPH 181)	ma ha hong	flowers	worship	1,2,3,4,5,6,7	H	Cu

Table 4.22 Cultural plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Scientific name	Local name	Plant parts used	Cultural usage	* Ethnic group	**Plants habit	*** Source of plants
Zingiberaceae	*Zingiber montanum* (J. Koenig) Link ex A. Dietr. (RPH 352)	phlai	leaves	eliminate evil	1,2,3,4,5,6,7	H	Cu
	Curcuma zedoaria (Christm.) Roscoe (RPH 125)	khi min	rhizome	holy water	1,2,3,4,5,6,7	H	1
	Globba winitii C. H. Wright (RPH 174)	wan sao long	leaves	keep a pocket	1,2,3,4,5,6,7	H	1

* 1 = Phu Thai , 2 = Kaleung, 3 = Kha, 4 = Sak , 5 = So, 6 = Yaw , 7 = Thai I –San

** H = Herb, T = Tree, ST = Shrubby tree, C = Climber, S = Shrub, S/ST = Shrub/Shrub tree, P = Palm, ScanS = Scandent Shrub, G = Grass, ST/T = Shrubby Tree/tree, US = Undershrub, CrH = Creeping Herb, HC = Herbaceous Climber, S/T = Shrub/Tree, WC = Woody Climber, AqH = Aquatic herb, B = Bamboo, CP = Climbing Palm limbing Palm, AqF = Aquatic Fern, EF = Epiphytic Fern, EO = Epiphytic Orchid, H/S = Herb/Shrub, H/ST = Herb / Shrubby Tree, PaHC = Parasitic Herbaceous Climber, PaS = Parasitic Shrub

*** Cu = cultivated, Fr = from the forest

Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Amaryllidaceae	*Allium sativum* L. (RPH 018)	kratiam	bulb	the components of the Chinese yeast cake	1,4	H	Cu
Anacardiaceae	*Mangifera indica* L. (RPH 222)	ma muang	stem	drum	1,2,3,4, 5,6,7	T	Cu
Apocynaceae	*Alstonia scholaris* (L.) R. Br. (RPH 026)	tin pet	gum	trap for Cicada	1,2,3,4, 5,6,7	T	Cu
	Streptocaulon juventas (Lour.) Merr. (RPH 322)	toapasong	roots	the components of the Chinese yeast cake	1	C	Fr
Arecaceae	*Areca catechu* L. (RPH 041)	mak	roots fruits	the components of the Chinese yeast cake,broom for cobweb	1,2,3,4, 5,6,7	P	Cu
	Calamus viminalis Willd. (RPH 071)	wai	roots	the components of the Chinese yeast cake	1,2,3,4, 5,6,7	CP	Cu
	Cocos nucifera L. (RPH 102)	ma phrao	roots,seed,petiole	the components of the Chinese yeast cake, dipper, broom,mop	1,2,3,4, 5,6,7	P	Cu
Bignoniaceae	*Oroxylum indicum* (L.) Benth. ex Kurz (RPH 257)	pheka	bark	the components of the Chinese yeast cake	1,2,4,5, 6,7	ST	Cu

Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Burseraceae	*Canarium subulatum* Guillaumin (RPH 074)	ma kok kluean	stem	build a house	1,2,4,5, 6,7	T	Fr
Clusiaceae	*Garcinia cowa* Roxb. ex Choisy (RPH 168)	chamuang	bark	dying color	1,2,4,5,6	T	Fr
Cyperaceae	*Actinoscirpus grossus* (L. f.) Goetgh. & D. A. Simpson (RPH 009)	koksamliam	stem	mat	1,2,3,4, 5,6,7	H	Fr
	Schoenoplectiella mucronata (L.) J. Jung & H. K. Choi (RPH 298)	kokkom	stem	mat	1,2,3,4, 5,6,7	H	Fr
Dioscoreaceae	*Dioscorea hispida* Dennst. (RPH 141)	kloi	roots	cosmetics	1,2,3,4, 5,6	HC	Fr
	Tacca leontopetaloides (L.) Kuntze (RPH 330)	taoyaimom	roots	the components of the Chinese yeast cake	1	C	Cu
Dipterocarpaceae	*Dipterocarpus alatus* Roxb. ex G. Don (RPH 148)	yangna	stem,gum	build a house, fuel	1,2,3,4, 5,6,7	T	Fr
	Dipterocarpus obtusifolius Teijsm. ex Miq. (RPH 149)	teng, sat	stem	build a house, loom, fuele,equipment in weaving,stool, litter	1,2,3,4,5 ,6,7	T	Fr
	Dipterocarpus tuberculatus Roxb. (RPH 150)	kung	leaves, gum	food wrapping,roofing , fuel	1,2,3,4, 5,6,7	T	Fr

Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Dipterocarpaceae	*Shorea obtusa* Wall. ex Blume (RPH 307)	teng,chik	bark, stem,gum	soaked in water, decoction,fuel,stool, litter	1,2,3,4, 5,6,7	T	Fr
	Shorea roxburghii G. Don (RPH 308)	phayom	stem,gum	build a house, fuel	1,2, 3,4,5,6,7	T	Fr
	Shorea siamensis Miq. (RPH 309)	rung	stem	build a house,stool	1,2,3,4, 5,6,7	T	Fr
Ebenaceae	*Diospyros mollis* Griff. (RPH 145)	ma kluea	stem, fruits	charcoal, dying color	1,2, 3,4,5,6,7	T	Fr
Fabaceae	*Adenanthera pavonina* L. (RPH 010)	ma klam ton	stem	dying color	1,2,4,5,6	T	Cu
	Caesalpinia sappan L. (RPH 069)	fang	bark	dying color	1,2, 3,4,5,6,7	ST	Fr
	Cassia fistula L. (RPH 081)	khun	stem	dying color	1,2,3,4, 5,6,7	T	Fr
	Tamarindus indica L. (RPH 332)	ma kham	stem	block	1,2, 3,4,5,6,7	T	Cu
	Acacia mangium Willd. (RPH 004)	kra thin the pha	stem	build a house	1,2,4,5, 6,7	T	Cu
	Afzelia xylocarpa (Kurz) Craib (RPH 012)	maka mong	stem	build a house	1,2,3,4, 5,6,7	T	Fr
	Albizia myriophylla Benth. (RPH 015)	cha aim pa	bark	the components of the Chinese yeast cake	1	C	Cu

Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Fabaceae	*Albizia saman* (Jacq.) Merr. (RPH 016)	cham churi	stem	build a house, lac	1,2,3,4, 5,6,7	T	Fr
	Bauhinia malabarica Roxb. (RPH 056)	som siao	bark	dying color	1,2,4,5,6	T	Fr
	Clitoria ternatea L. (RPH 100)	anchan	flowers	wash hair	1,2,3,4, 5,6,7	C	Fr
	Dalbergia cochinchinensis Pierre(RPH 132)	phayung	stem	build a house	1,2,3,4, 5,6,7	T	Cu
	Indigofera tinctoria L. (RPH 193)	khram	leaves	dying color	1,2,3,4, 5,6,7	S	Cu
	Peltophorum dasyrrhachis (Miq.) Kurz (RPH 267)	arang	bark	dying color	2,4,5,6,7	T	Cu
	Pterocarpus indicus Willd. (RPH 286)	pradu ban	stem	build a house,dying color	1,2,3,4, 5,6,7	T	Cu
	Senna siamea (Lam.) H. S. Irwin & Barneby (RPH 302)	kee lek	bark	dying color	1,2, 3,4,5,6,7	T	Fr
	Sindora siamensis Teijsm. ex Miq. var. *siamensis* (RPH 311)	makha tae	stem	build a house	1,2,3,4,5 ,6,7	T	Fr
	Uraria crinita (L.) Desv. ex DC. (RPH 345)	hang ma chok	leaves	worm removal	1,4,5	US	Fr
	Xylia xylocarpa (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen (RPH 350)	dang	stem	build a house	1,2,3,4, 5,6,7	T	Fr

Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Gentianaceae	*Fagraea fragrans* Roxb. (RPH 162)	han krao	stem	furniture	1,2,4,5, 6,7	T	Fr
Hypericaceae	*Cratoxylum cochinchinense* (Lour.) Blume (RPH 110)	tio	stem	charcoal	1,2,3,4, 5,6,7	T	Fr
Irvingiaceae	*Irvingia malayana* Oliv. ex A. W. Benn. (RPH 197)	krabok	stem	build a house	1,2, 3,4,5,6,7	T	Fr
Lamiaceae	*Tectona grandis* L. f. (RPH 333)	sak	stem,leaves	build a house,dye hair color,dying color	1,2,3,4, 5,7	T	Cu
Lauraceae	*Litsea glutinosa* (Lour.) C. B. Rob. (RPH 217)	mi	leaves	wash hair	1,4,5,7	T	Fr
	Persea kurzii Kosterm. (RPH 270)	yang bong	gum	incense	1,2,3,4, 5,6,7	T	Fr
Lythraceae	*Lagerstroemia floribunda* Jack var. *floribunda* (RPH 208)	ta baek plueak bang	stem	build a house	1,2, 3,4,5,6,7	T	Fr
	Lawsonia inermis L. (RPH 211)	thian king	leaves	dye hair color	1,4,5,6,7	S	Cu
Malvaceae	*Ceiba pentandra* (L.) Gaertn. (RPH 084)	ngio	fruits	fiber for pillow	1,2,3,4, 5,6,7	T	Cu
	Gossypium herbaceum L. (RPH 178)	fai	fiber	cloth	1,2,3,4, 5,6,7	S	Cu
Marantaceae	*Schumannianthus dichotomus* (Roxb.) Gagnep. (RPH 299)	khla	stem	rice packing	1,2,4,5, 6,7	H	Fr

Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Melastomataceae	*Memecylon edule* Roxb. (RPH 228)	phlong mueat	stem	dying color	2,4,5	S/ST	Fr
Meliaceae	*Azadirachta indica* A. Juss. (RPH 049)	sadao	leaves, bark	head lice,dying color	1	T	Cu
Moraceae	*Artocarpus heterophyllus* Lam. (RPH 044)	khanun	stem	dying color, folk instruments	1,2, 3,4,5,6,7	T	Cu
	Artocarpus lacucha Roxb. ex Buch.-Ham. (RPH 045)	ma hat	stem	folk instruments	1,2,4,5,7	T	Fr
	Ficus religiosa L. (RPH 166)	pho si maha pho	gum	trap for Cicada	1,2,3,4, 5,6,7	T	Fr
	Streblus asper (RPH 321)	khoi	leaves	brush the teeth	1,2,3,4, 5,6,7	T	Fr
Musaceae	*Musa balbisiana* Colla (RPH 245)	kluai tani	leaves, whole parts	food wrapping,string	1,2,3,4, 5,6,7	H	Cu
	Musa × *paradisiaca* L. (RPH 244)	kluai namwa	fruits, flowers		1,2,3,4, 5,6,7	H	Cu
Pandanaceae	*Pandanus amaryllifolius* Roxb. (RPH 263)	toei	leaves	the components of the Chinese yeast cake	1,2,3,4, 5,6,7	S	Cu
	Pandanus kaida Kurz (RPH 264)	toei san suea	leaves	mat	2,4,5,6,7	S/ST	Fr
Phyllanthaceae	*Phyllanthus emblica* L. (RPH 273)	ma kham pom	stem	charcoal	1,2,4,5, 6,7	ST/T	Fr

Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Piperaceae	*Piper nigrum* L. (RPH 276)	phrik thai	fruits	the components of the Chinese yeast cake	1,2	C	Cu
Poaceae	*Bambusa nutans* Wall. ex Munro (RPH 052)	phai bong	stem,bamboo shoots	tools to catch fish, instrument in daily use,rice bat,put into fermented fish,basketry, litter	1,2,3,4, 5,6,7	B	Cu
	Dendrocalamus strictus (Roxb.) Nees (RPH 134)	phai sang pai	stem	straw for local whisky, folk instruments	1	B	Fr
	Imperata cylindrica (L.) Raeusch. (RPH 192)	ya kha	leaves	roofing	1,5,7	G	Fr
	Oryza sativa L. (RPH 259)	khao	fruits	crop, the components of the Chinese yeast cake,wash hair	1,2, 3,4,5,6,7	G	Cu
	Bambusa multiplex (Lour.) Raeusch. ex Schult. f. (RPH 051)	phai sang phrai	stem	basketry	1,2, 3,4,5,6,7	B	Cu
	Saccharum officinarum L. (RPH 293)	oi	stem	Chinese yeast cake	1	G	Cu
Rubiaceae	*Catunaregam tomentosa* (Blume ex DC.) Tirveng. (RPH 083)	nam thaeng	fruits	wash hair, do the laundry	1,2,4,5, 6,7	S/ST	Fr

Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Rubiaceae	*Morinda citrifolia* L. (RPH 239)	yo ban	leaves	food wrapping	1,2, 3,4,5,6,7	ST	Cu
	Morinda coreia Buch.-Ham. (RPH 240)	yo pa	whote parts	dying color	1,2,4,5,7	ST	Fr
	Paederia linearis Hook. f. var. *linearis* (RPH 262)	tot mu tot ma	roots,vines	the components of the Chinese yeast cake, roots is a component of the cracker.	1,2,3,4, 5,6,7	C	Fr
Rutaceae	*Citrus hystrix* DC. (RPH 095)	ma krut	leaves	wash hair	1,2,3,4, 5,6,7	ST	Cu
	Clausena guillauminii Tanaka (RPH 097)	song fa	leaves	the components of the Chinese yeast cake	1	S	Fr
Sapindaceae	*Lepisanthes rubiginosa* (Roxb.) Leenh. (RPH 213)	ma huat	leaves	the components of the Chinese yeast cake	1	S/ST	Fr
Sapindaceae	*Schleichera oleosa* (Lour.) Merr. (RPH 297)	ta khro	bark	dying color	1,2,4,5, 6,7	T	Fr
Sapotaceae	*Mimusops elengi* L. (RPH 233)	phikun	bark	dying color	2,4,5,6,7	T	Cu
Solanaceae	*Capsicum annuum* L. (RPH 076)	phrik	fruits	crop,the components of the Chinese yeast cake	1,2,3,4, 5,6,7	US	Cu

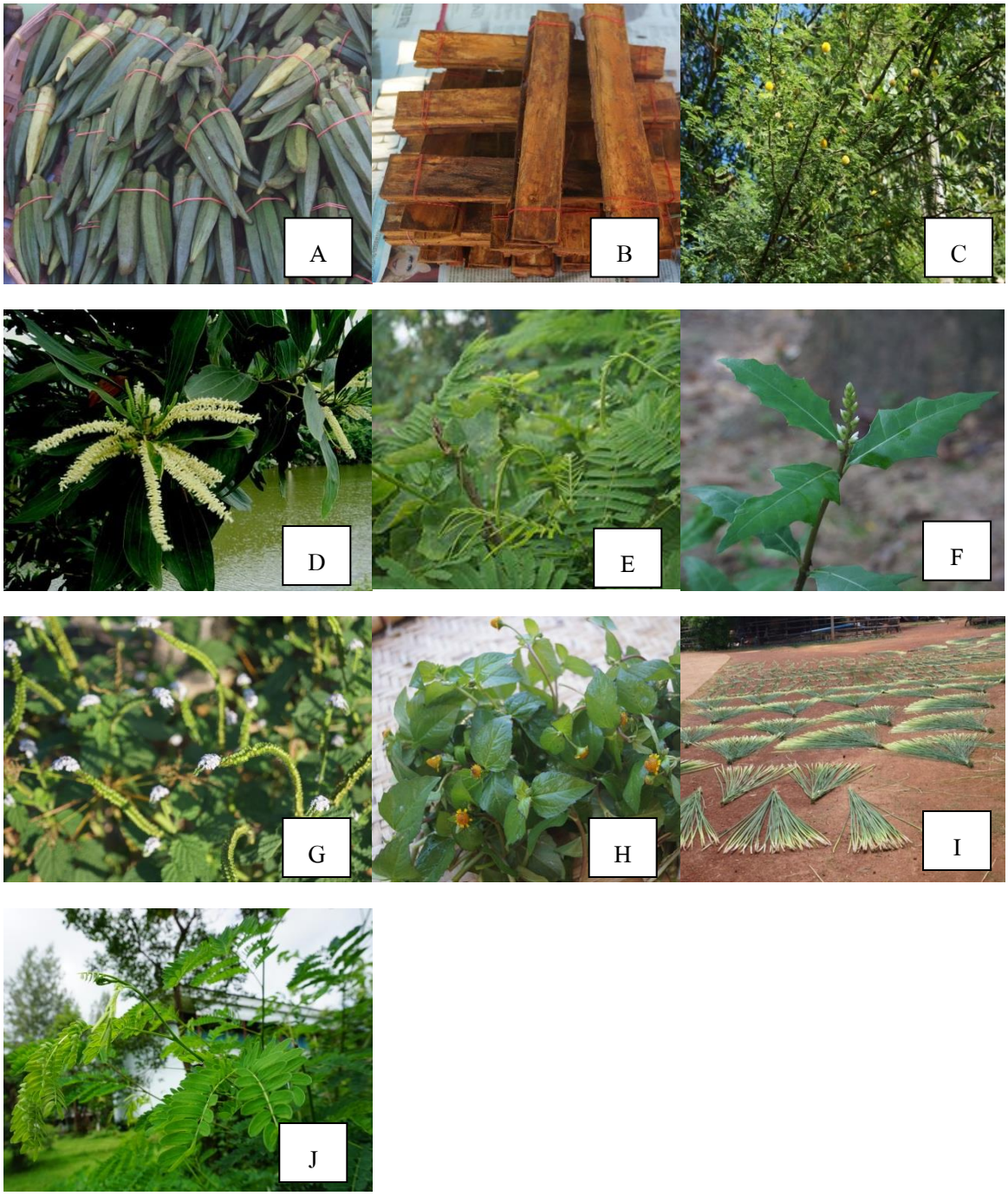
Table 4.23 Other used plants of the ethnic groups in Nakhon Phanom province (continued).

Family	Sciencetific name	Local name	Plant parts used	Used	* Ethnic group	** Plants habit	*** Source of plants
Solanaceae	*Harrisonia perforate* (Blanco) Merr. (RPH 180)	si fun khon tha	leaves, roots	the components of the Chinese yeast cake	1	ScanS	Fr
	Nicotiana tabacum L. (RPH 252)	ya sub	leaves	crop, the components of the Chinese yeast cake	1,2,3,4, 5,6,7	H	Cu
Styracaceae	*Styrax benzoides* Craib (RPH 234)	kum yan	roots	the components of the Chinese yeast cake	1	T	Cu
Zingiberaceae	*Alpinia galanga* (L.) Willd. (RPH 023)	kha	rhizome	the components of the Chinese yeast cake	1,2,4,5,6	H	Cu
	Kaempferia parviflora Wall. ex Baker (RPH 204)	khra chai dam	rhizome	the components of the Chinese yeast cake	1	H	Cu

* 1 = Phu Thai , 2 = Kaleung, 3 = Kha, 4 = Sak , 5 = So, 6 = Yaw , 7 = Thai I –San

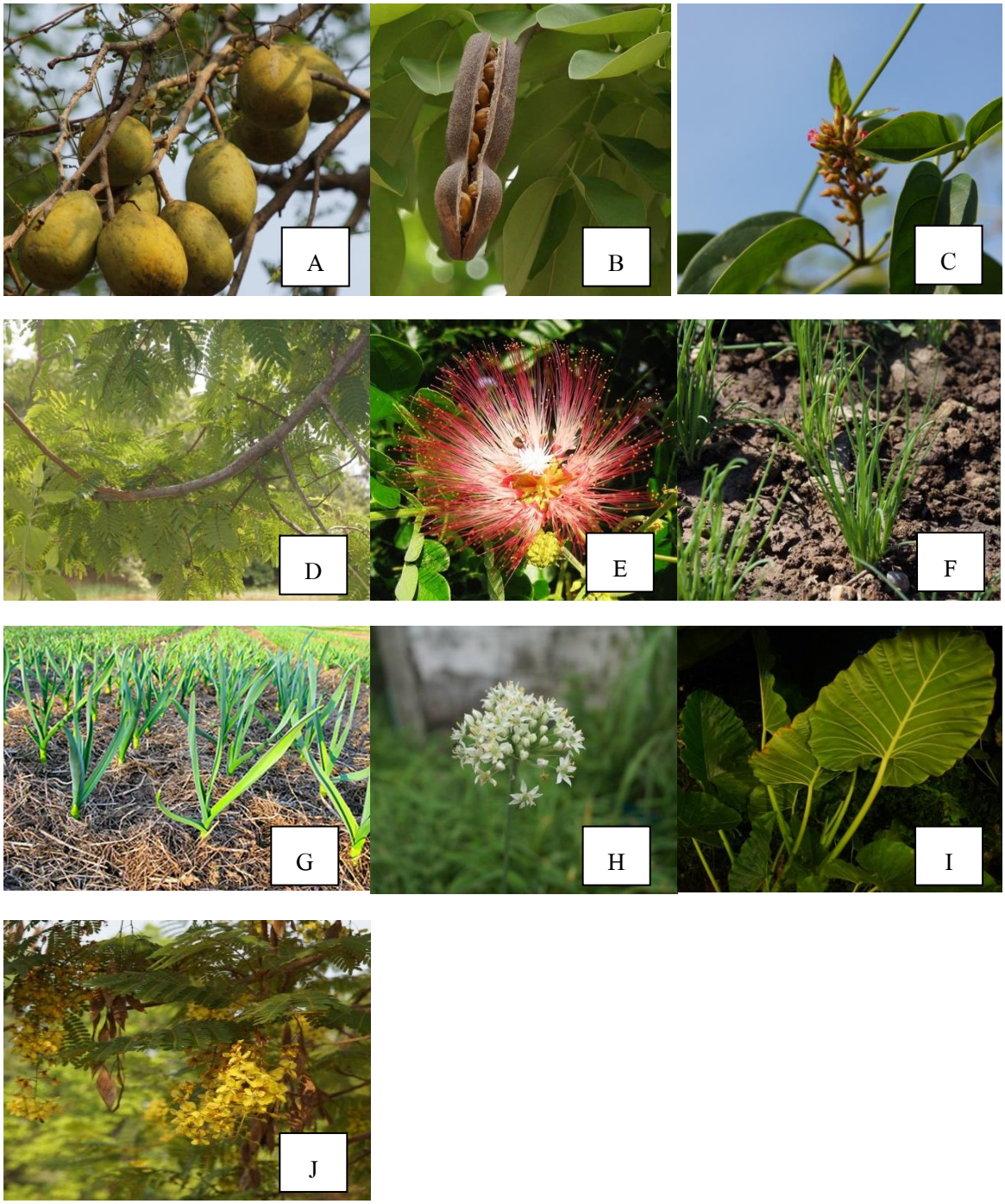
** H = Herb, T = Tree, ST = Shrubby tree, C = Climber, S = Shrub, S/ST = Shrub/Shrub tree, P = Palm, ScanS = Scandent Shrub, G = Grass, ST/T = Shrubby Tree/tree, US = Undershrub, CrH = Creeping Herb, HC = Herbaceous Climber, S/T = Shrub/Tree, WC = Woody Climber, AqH = Aquatic herb, B = Bamboo, CP = Climbing Palm limbing Palm, AqF = Aquatic Fern, EF = Epiphytic Fern, EO = Epiphytic Orchid, H/S = Herb/Shrub, H/ST = Herb / Shrubby Tree, PaHC = Parasitic Herbaceous Climber, PaS = Parasitic Shrub

*** Cu = cultivated, Fr = from the forest



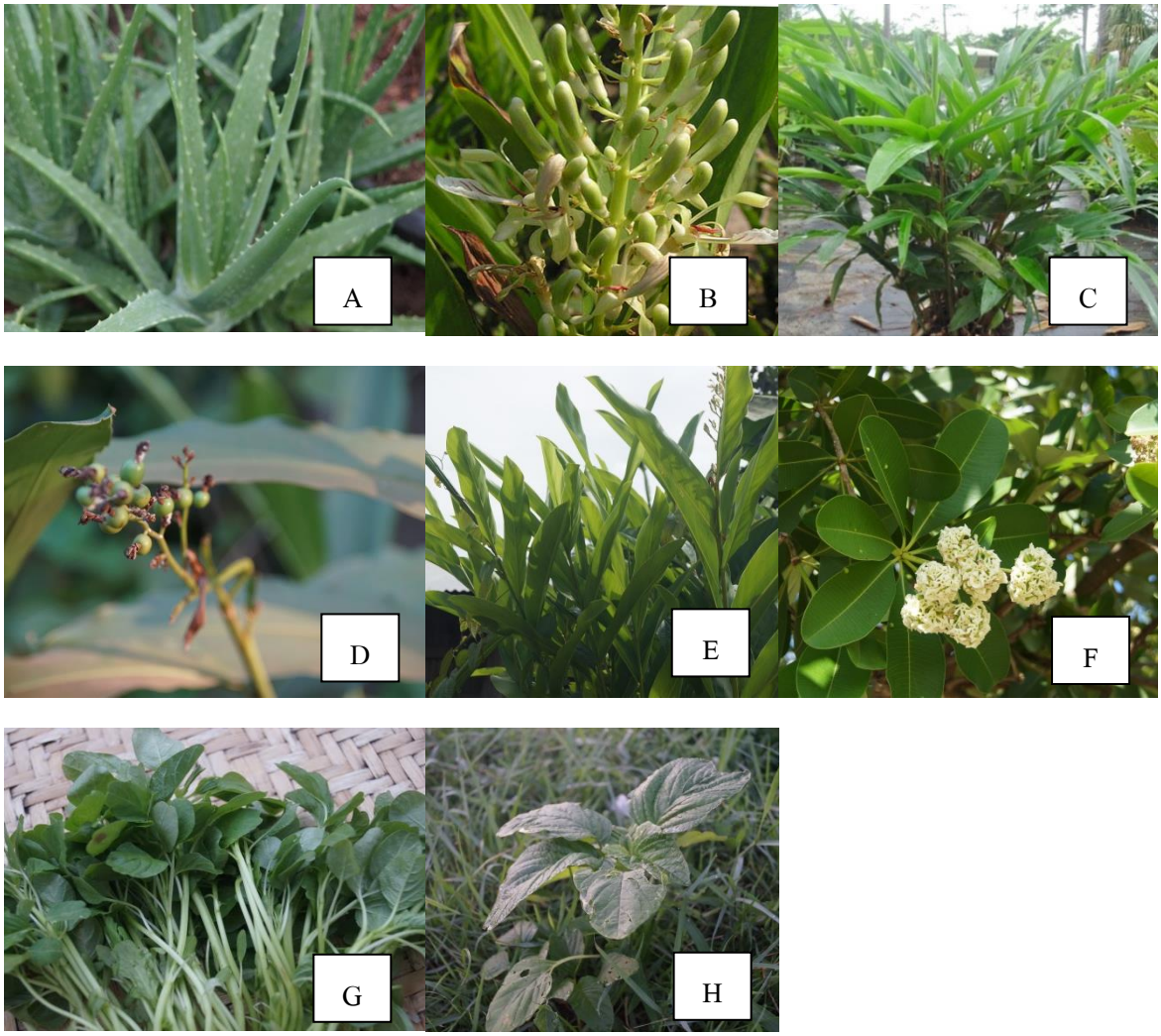
A: *Abelmoschus esculentus* (L.) Moench
B: *Acacia catechu* (L. f.) Willd.
C: *Acacia concinna* (Willd.) DC.
D: *Acacia mangium* Willd.
E: *Acacia Pennata* (L.) Willd.Subsp.Insuavis Nielsen
F: *Acanthus ebracteatus* Vahl
G: *Achyranthes aspera* L.
H: *Acmella oleracea* (L.) R. K. Jansen
I : *Actinoscirpus grossus* (L. f.) Goetgh. & D. A. Simpson
J : *Adenanthera pavonina* L.

Figure 4.8 *Abelmoschus esculentus* (L.) Moench - *Adenanthera pavonina* L.



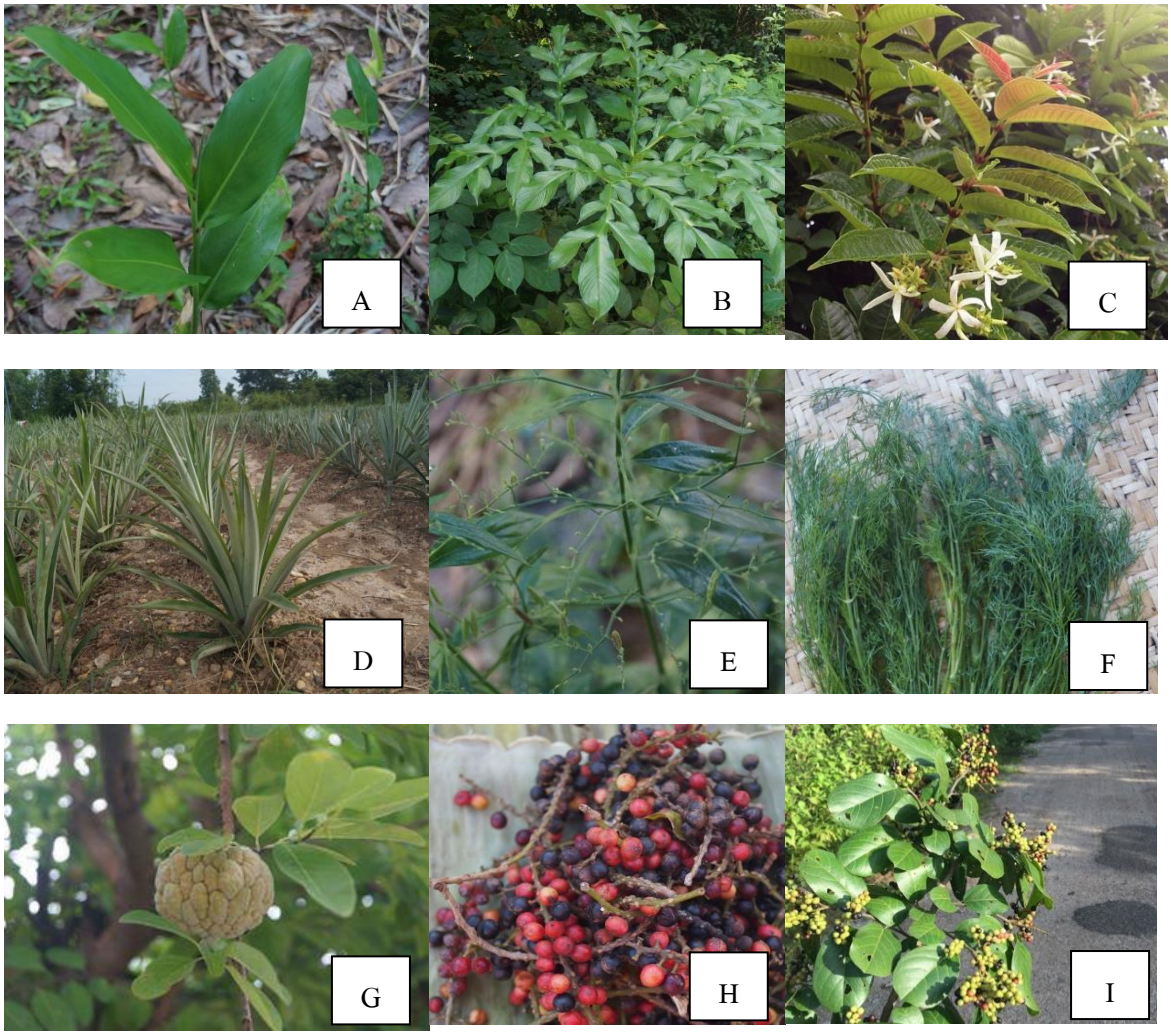
A: *Aegle marmelos* (L.) Corrêa ex Roxb.
B: *Afzelia xylocarpa* (Kurz) Craib
C: *Aganonerion polymnorphum* Pierre ex Spire
D: *Albizia myriophylla Benth.*
E: *Albizia saman* (Jacq.) Merr.
F: *Allium ascalonicum* L.
G: *Allium sativum* L.
H: *Allium tuberosum* Rottler ex Spreng.
I: *Alocasia macrorrhizos* (L.) G. Don
J: *Albizia lebbekoides* (DC.) Benth.

Figure 4.9 *Aegle marmelos* (L.) Corrêa ex Roxb.- *Albizia lebbekoides* (DC.) Benth.



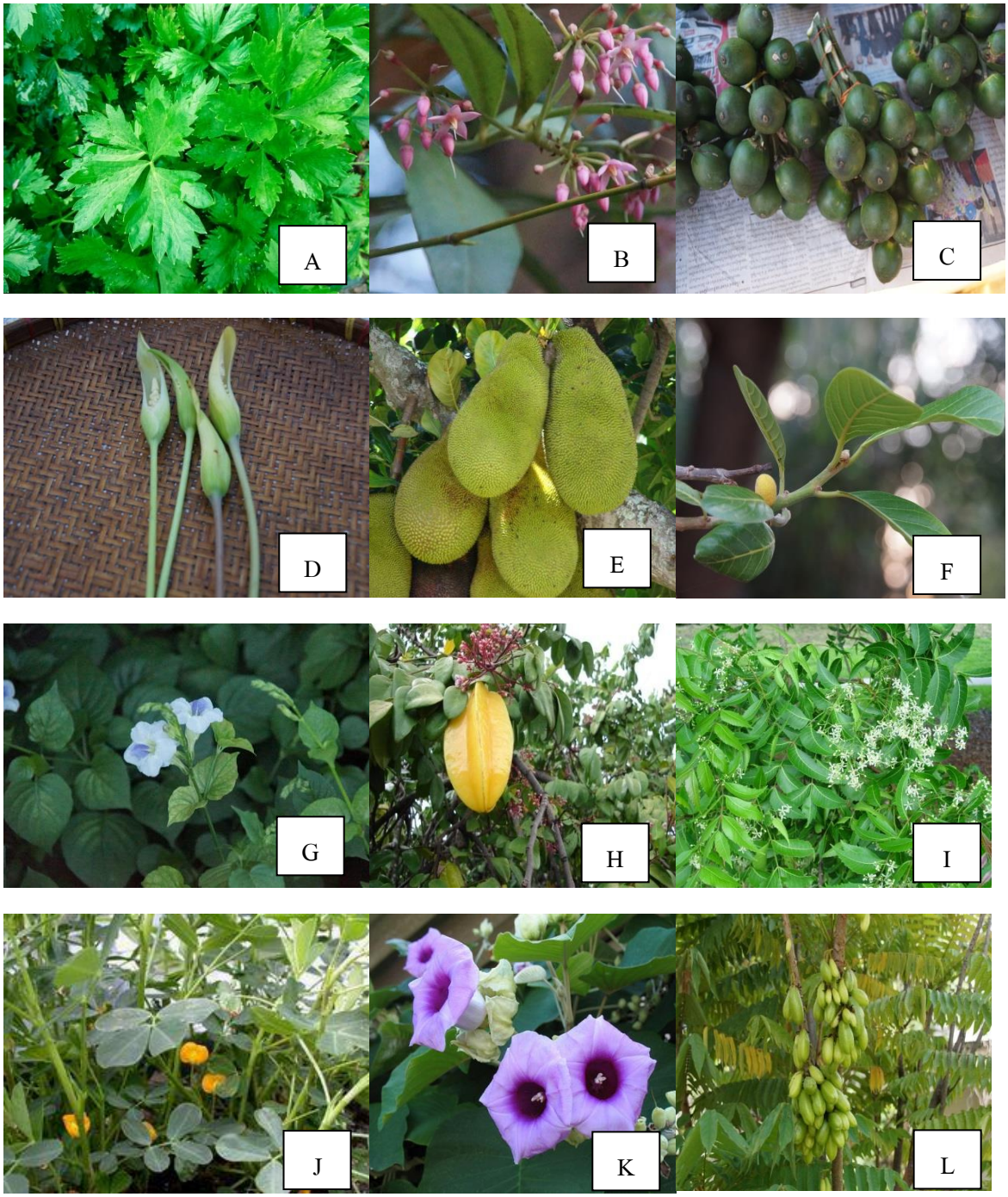
A: *Aloe vera* (L.) Burm. f.
B: *Alpinia galanga* (L.) Willd
C: *Alpinia zerumbet*
D: *Alpinia conchigera* Griff.
E: *Alpinia siamensis* K. Schum.
F: *Alstonia scholaris* (L.) R. Br.
G: *Amaranthus lividus* L.
H: *Amaranthus spinosus* Linn.

Figure 4.10 *Aloe vera* (L.) Burm. f. - *Amaranthus spinosus* Linn.



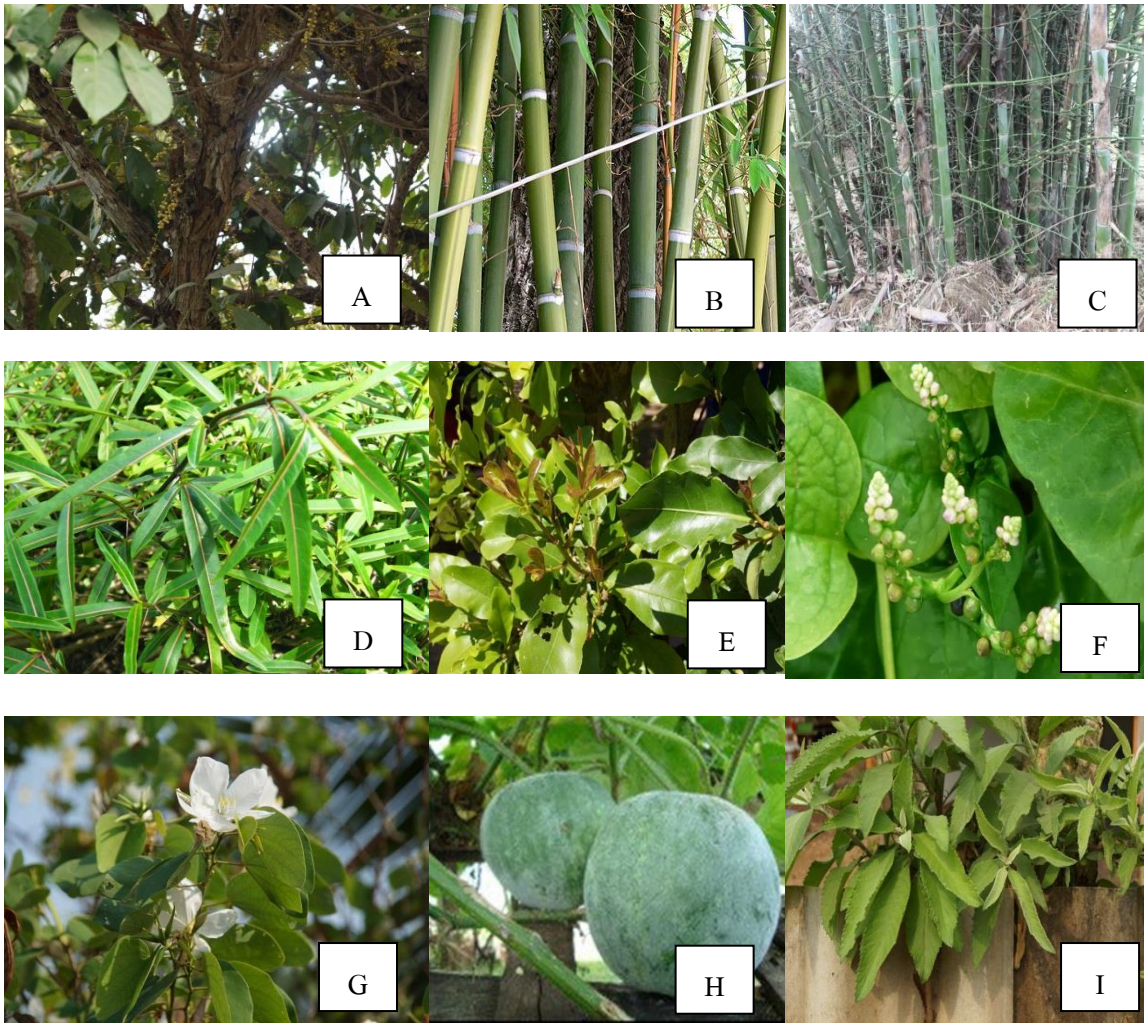
A: *Amomum villosum* Lour. var. *xanthioides* (Wall. ex Baker) T. L. Wu & S. J. Chen
B: *Amorphophallus paeoniifolius* (Dennst.) Nicolson
C: *Amphineurion marginatum* (Roxb.) D. J. Middleton
D: *Ananas comosus* (L.) Merr.
E: *Andrographis paniculata* (Burm. f.) Wall. ex Nees
F: *Anethum graveolens* L.
G: *Annona squamosa* L.
H: *Antidesma acidum* Retz.
I: *Antidesma ghaesembilla* Gaertn.

Figure 4.11 *Amomum villosum* Lour. var. *xanthioides* (Wall. ex Baker) T. L. Wu & S. J. Chen - *Antidesma ghaesembilla* Gaertn.



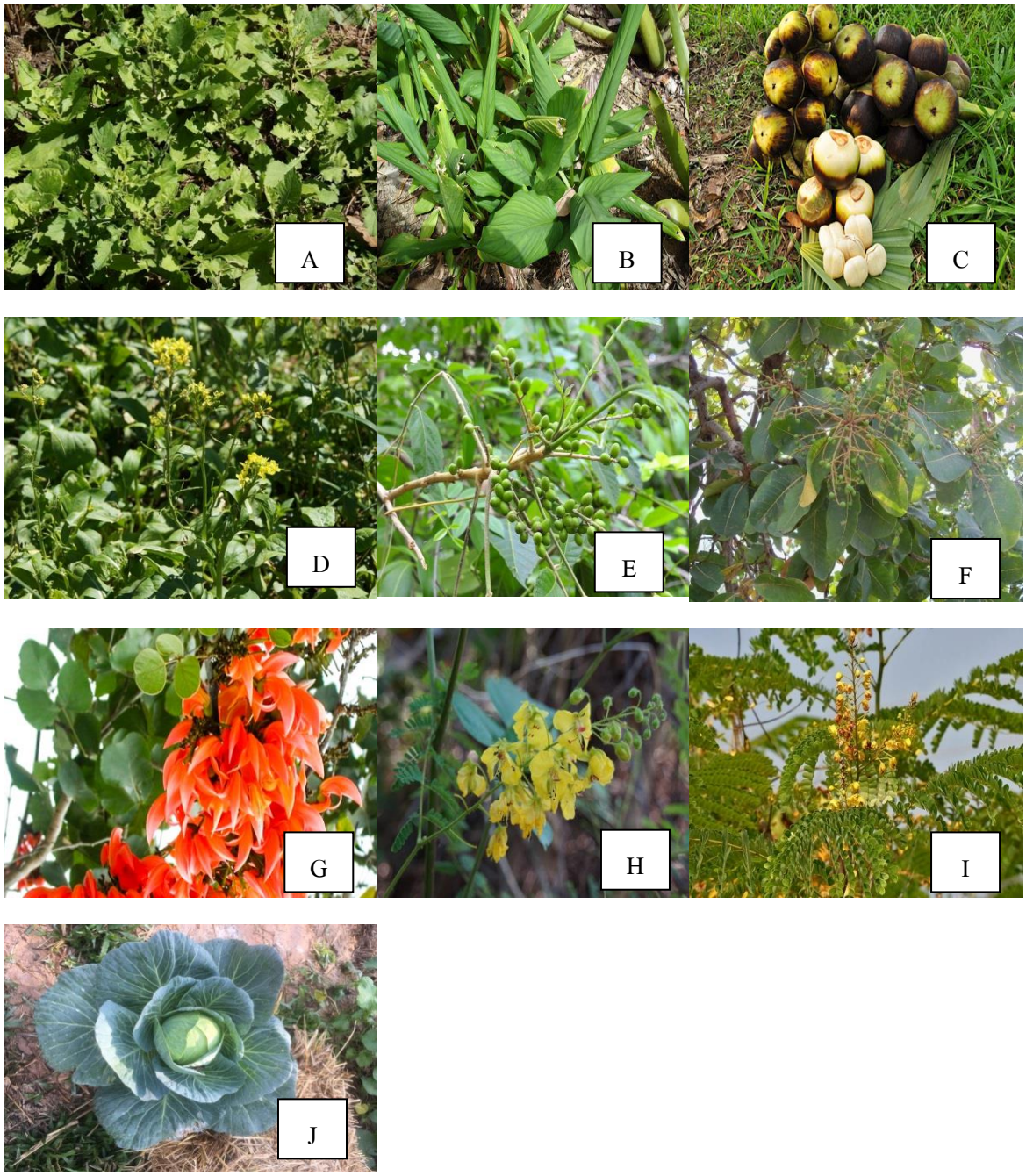
A: *Apium graveolens* L.
B : *Ardisia pilosa* H. R. Fletcher
C: *Areca catechu* L.
D : *Arisaema petiolatum* Gagnep.
E : *Artocarpus heterophyllus* Lam.
F : *Artocarpus lacucha* Roxb. ex Buch.-Ham.
G : *Asystasia gangetica* (L.) T. Anderson subsp. *gangetica*
H: *Averrhoa carambola* L.
I : *Azadirachta indica A. Juss.*
J : *Arachis hypogaea* L.
K: *Argyreia nervosa* (Burm. f.) Bojer
L: *Averrhoa bilimbi* L.

Figure 4.12 *Apium graveolens* L. - *Averrhoa bilimbi* L.



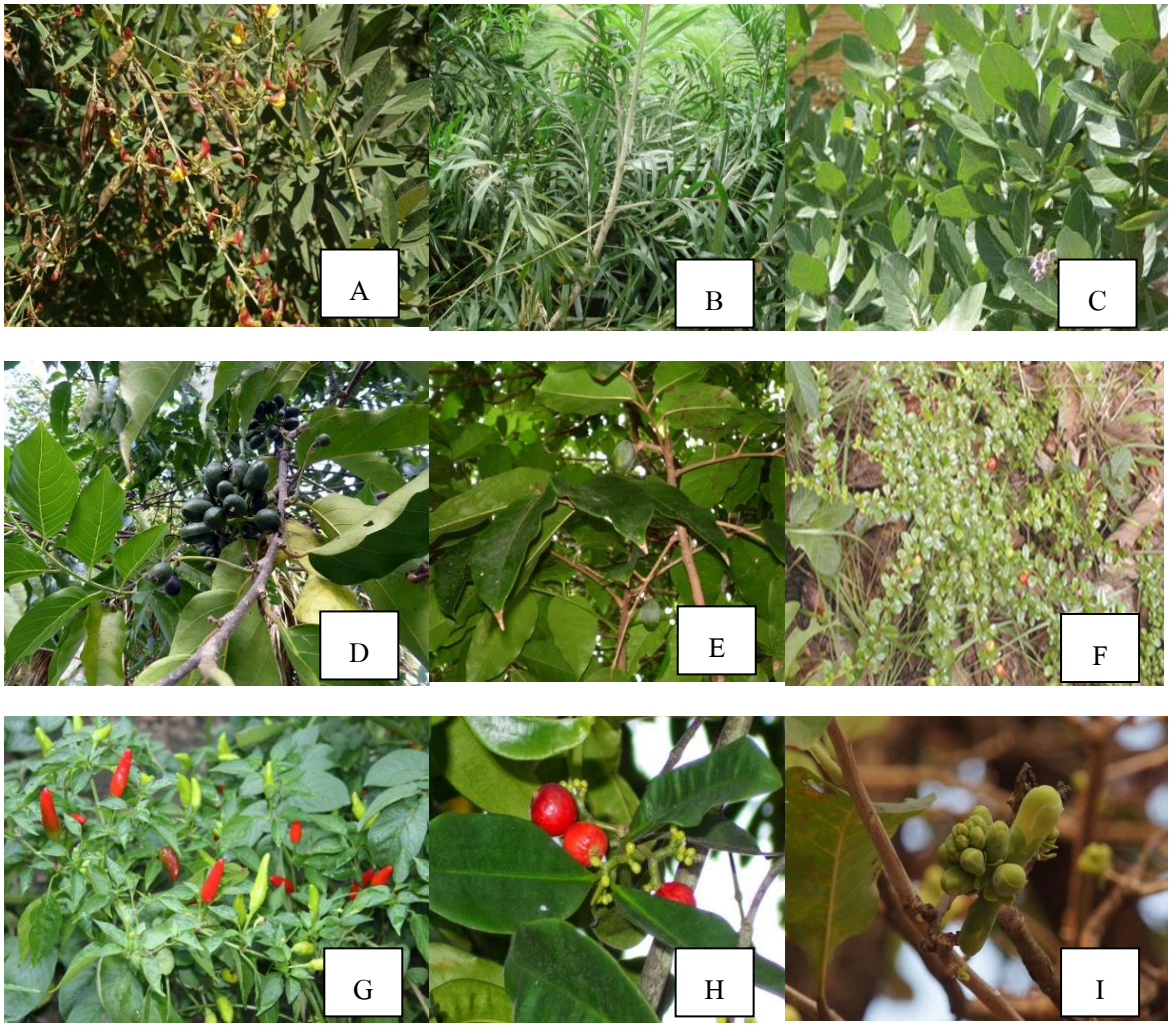
A: *Baccaurea ramiflora* Lour.
B : *Bambusa multiplex* (Lour.) Raeusch. ex Schult. f.
C : *Bambusa nutans* Wall. ex Munro
D : *Barleria lupulina* Lindl.
E : *Barringtonia acutangula* (L.) Gaertn.
F : *Basella alba* L.
G : *Bauhinia malabarica* Roxb. H: *Benincasa hispida* (Thunb.) Cogn.
I : *Blumea balsamifera* (L.) DC.

Figure 4.13 *Baccaurea ramiflora* Lour. - *Blumea balsamifera* (L.) DC.



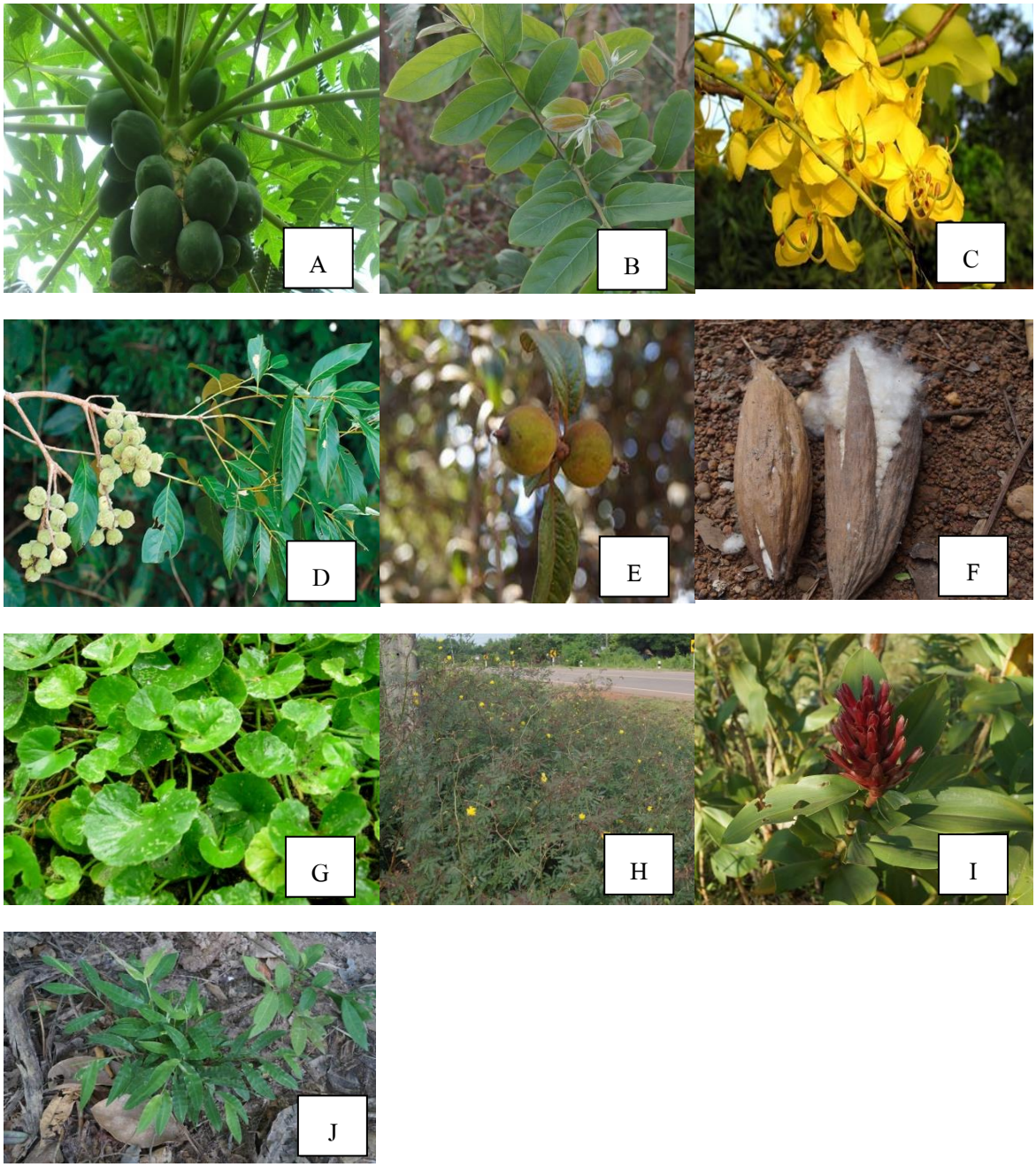
A: *Blumea napifolia* DC.
B: *Boesenbergia rotunda*
C: *Borassus flabellifer* L.
D: *Brassica juncea* (L.) Czern.
E: *Brucea javanica* (L.) Merr.
F: *Buchanania latifolia* Roxb.
G: *Butea monosperma* (Lam.) Taub.
H: *Caesalpinia mimosoides* Lam.
I : *Caesalpinia sappan* L.
J : *Brassica oleracea* L. Group *Capitata*

Figure 4.14 *Blumea napifolia* DC. - *Brassica oleracea* L. Group *Capitata*



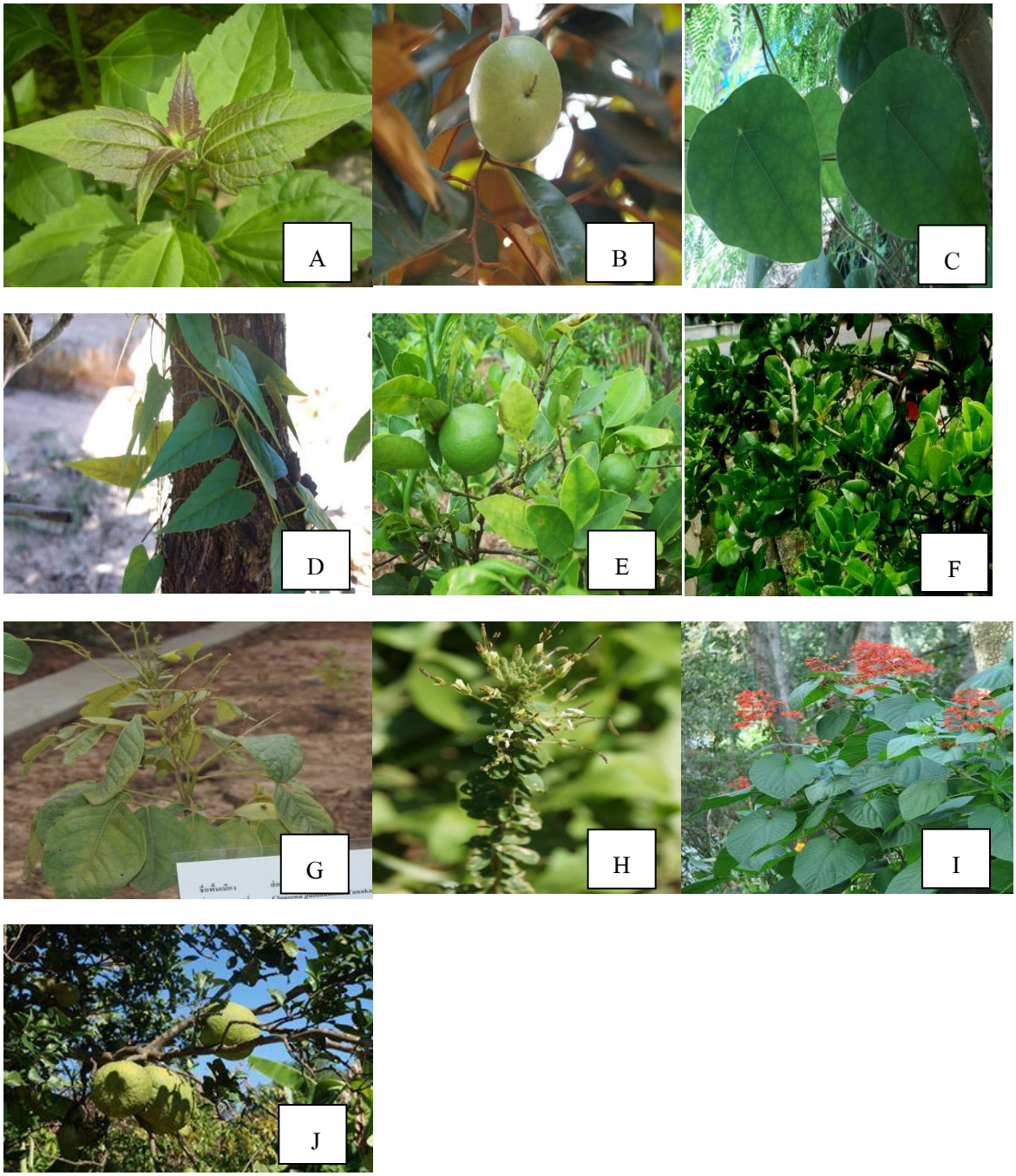
A: *Cajanus cajan* (L.) Millsp.
B: *Calamus viminalis* Willd.
C: *Calotropis gigantea* (L.) W. T. Aiton
D: *Cananga odorata* (Lam.) Hook. f. & Thomson var. *odorata*
E: *Canarium subulatum* Guillaumin
F: *Canthium berberidifolium* Geddes
G: *Capsicum annuum* L.
H: *Carallia brachiata* (Lour.) Merr.
I: *Careya arborea* Roxb.

Figure 4.15 *Cajanus cajan* (L.) Millsp. - *Careya arborea* Roxb.



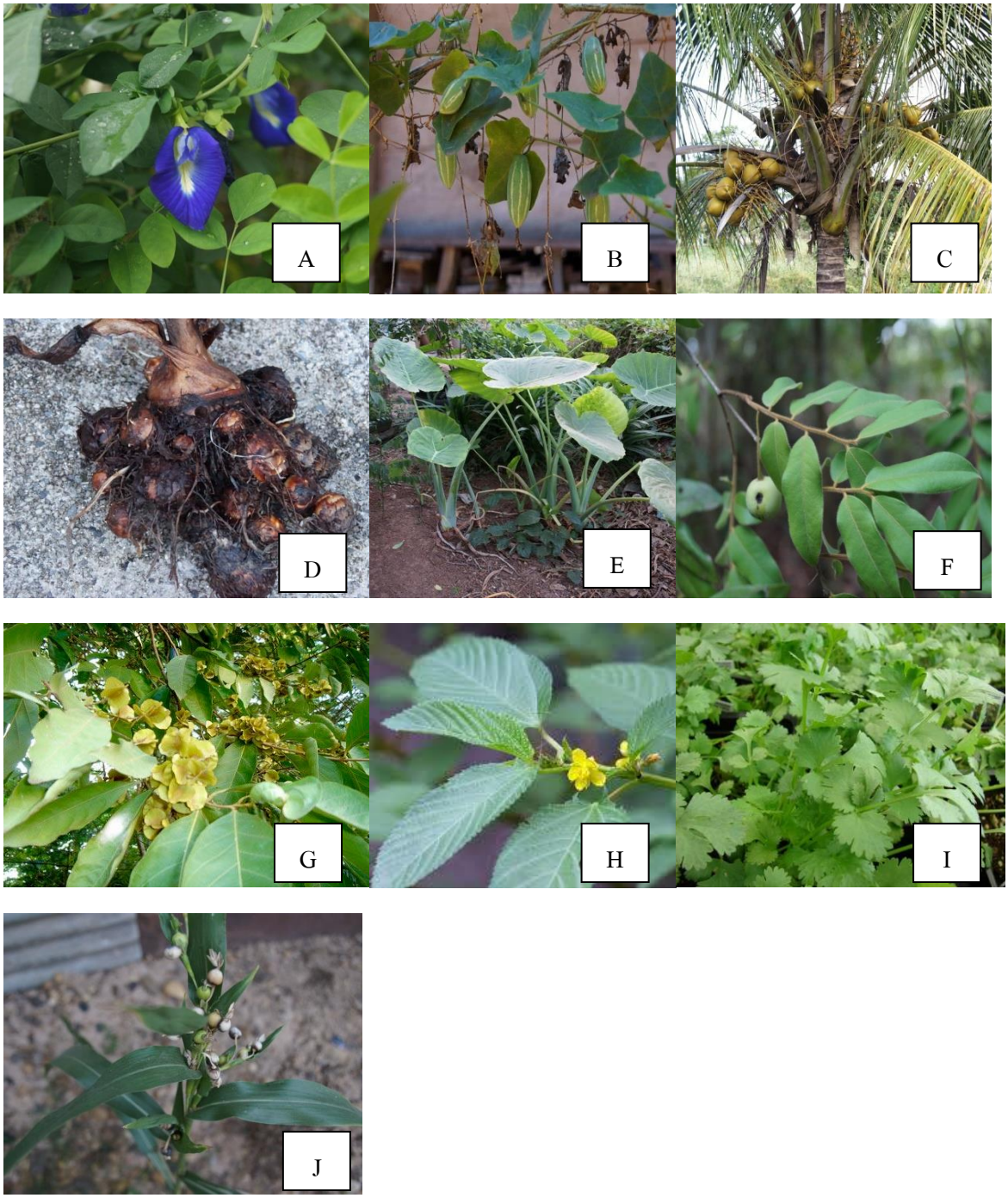
A: *Carica papaya* L.
B: *Casearia grewiifolia* Vent.
C: *Cassia fistula* L.
D: *Castanopsis piriformis* Hickel & A. Camus
E: *Catunaregam tomentosa* (Blume ex DC.) Tirveng.
F : *Ceiba pentandra (L.) Gaertn.*
G: *Centella asiatica* (Linn.) Urban.
H: *Chamaecrista mimosoides* (L.) Greene
I: *Cheilocostus speciosus* (J. Koenig) C. D. Specht
J: *Centotheca lappacea* (L.) Desv.

Figure 4.16 *Carica papaya* L.- J: *Centotheca lappacea* (L.) Desv.



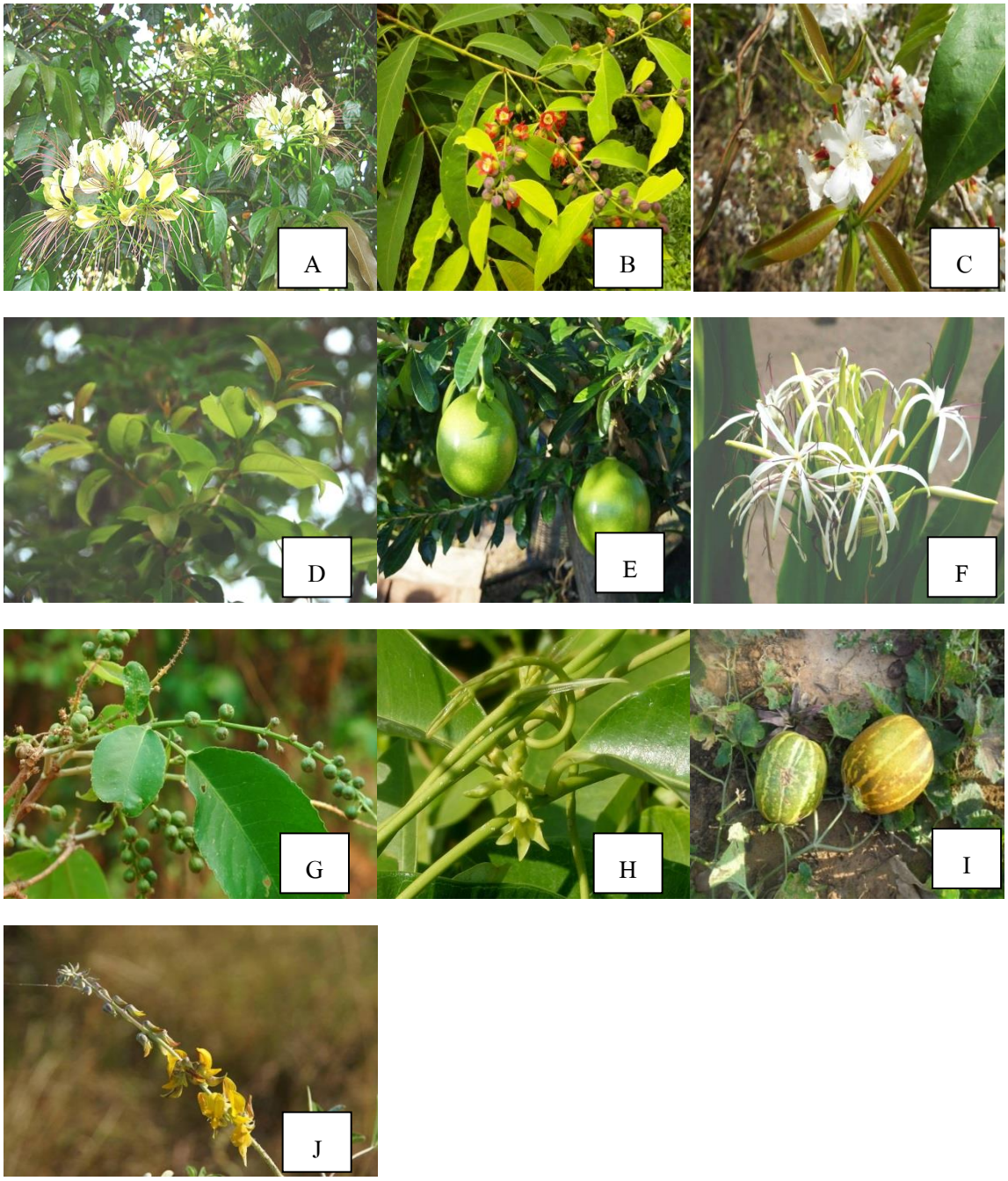
A: *Chromolaena odorata* (L.) R. M. King & H. Rob.
B: *Chrysophyllum cainito* L.
C: *Cissampelos pareira* L. var.hirsuta (Buch. ex DC.) Forman .
D: *Cissus hastata* Miq
E: *Citrus* × *aurantifolia (Christm.) Swingle*
F : *Citrus hystrix* DC.
G: *Clausena guillauminii Tanaka*
H: *Cleome gynandra* L.
I: *Clerodendrum paniculatum* L.
J : *Citrus ichangensis* Swingle

Figure 4.17 *Chromolaena odorata* (L.) R. M. King & H. Rob. - *Citrus ichangensis* Swingle



A : *Clitoria ternatea* L.
B: *Coccinia grandis* (L.) Voigt
C : *Cocos nucifera L.*
D : *Colocasia esculenta* Schott
E: *Colocasia gigantea* Hook. f.
F : *Colubrina asiatica* (L.) Brongn. var. *asiatica*
G: *Combretum quadrangulare* Kurz
H: *Corchorus aestuans* L.
I : *Coriandrum sativum* L.
J : *Coix lachryma-jobi* L.

Figure 4.18 *Clitoria ternatea* L. - *Coix lachryma-jobi* L.

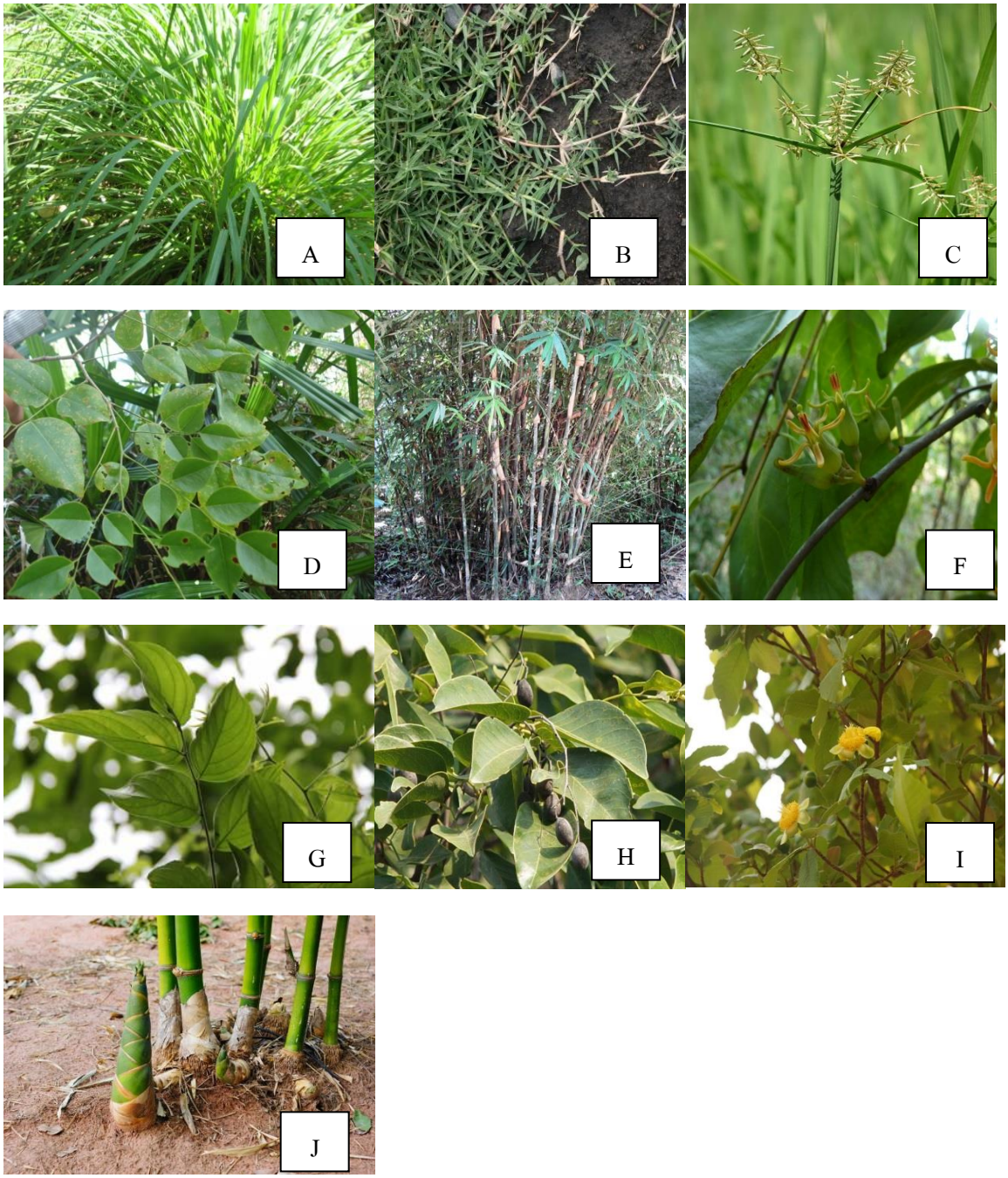


A: *Crateva adansonii* DC. subsp. *trifoliata* Jacobs.
B: *Cratoxylum cochinchinense* (Lour.) Blume C: *Cratoxylum formosum* Byer
D: *Cratoxylum formosum* (Jacq.) Benth. & Hook.
f. ex Dyer subsp. *pruniflorum* (Kurz) Gogelein
E: *Crescentia cujete* L. F: *Crinum asiaticum* L. var. *asiaticum*
G: *Croton argyratus* Blume
H: *Cryptolepis dubia* (Burm. f.) M. R. Almeida I: *Cucumis melo* L.
J: *Crotalaria pallida* Aiton

Figure 4.19 *Crateva adansonii* DC. subsp. *trifoliata* Jacobs. - *Crotalaria pallida* Aiton

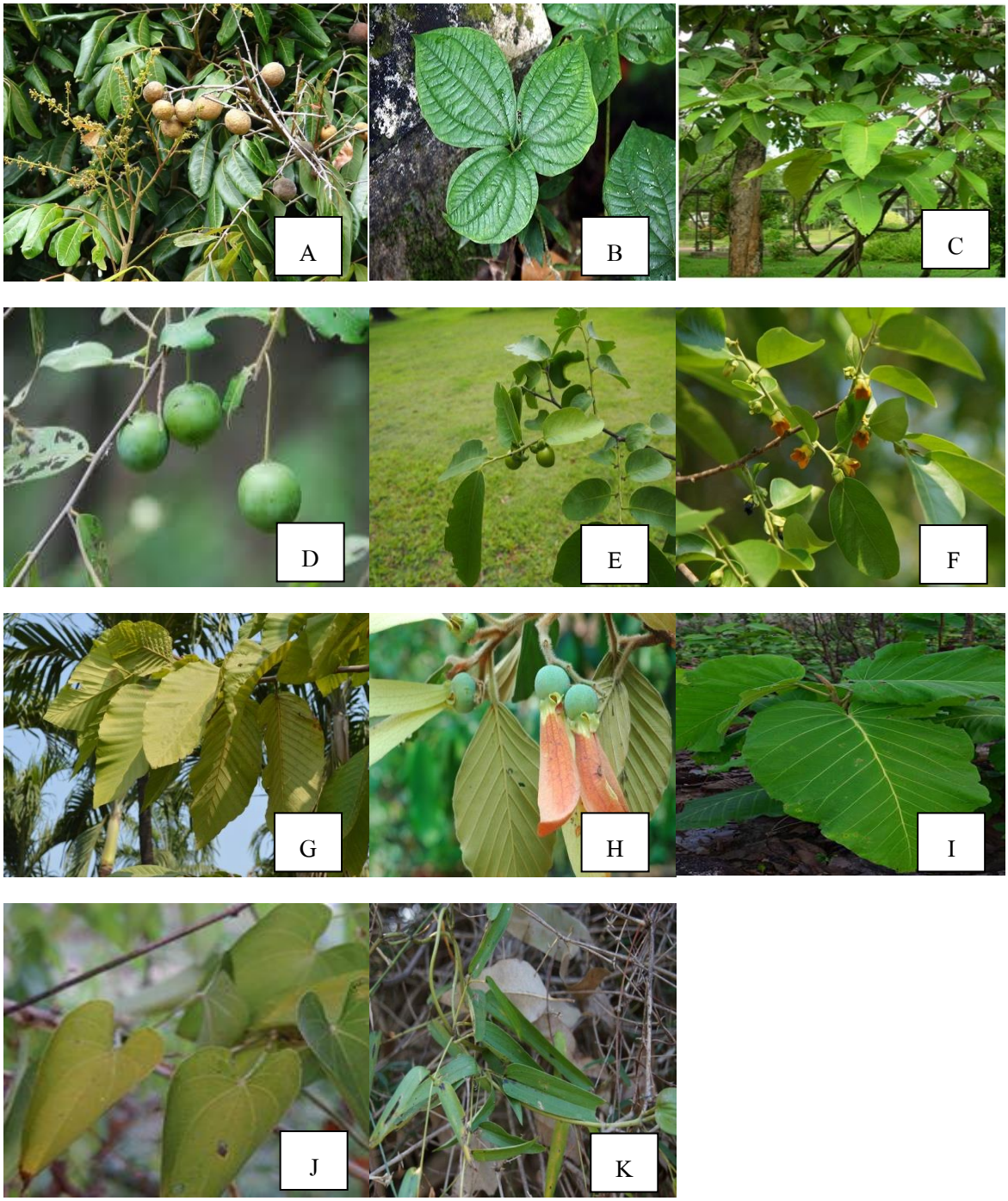
A: *Cucurbita moschata* Duchesne
B: *Curcuma comosa* Roxb.
C: *Curcuma longa* L.
D: *Curcuma parviflora* Wall.
E: *Curcuma sessilis* Gage
F: *Curcuma zedoaria (Christm.) Roscoe*
G: *Cuscuta chinensis* Lam.
H: *Cymbidium aloifolium* (L.) Sw.
I: *Cymbopogon citratus* (DC.) Stapf

Figure 4.20 *Cucurbita moschata* Duchesne - *Cymbopogon citratus* (DC.) Stapf



A: *Cymbopogon nardus* (L.) Rendle.
B: *Cynodon dactylon* (L.) Pers.
C: *Cyperus rotundus* L.
D: *Dalbergia cochinchinensis* Pierre
E: *Dendrocalamus strictus* (Roxb.) Nees
F: *Dendrophthoe pentandra* (L.) Miq.
G: *Desmos chinensis* Lour.
H: *Dialium cochinchinense* Pierre
I: *Dillenia ovata* Wall. ex Hook. f. & Thomson
J: *Dendrocalamus asper* (Schultes & J. H. Schultes) Backer ex K. Heyne

Figure 4.21 *Cymbopogon nardus* (L.) Rendle. - *Dendrocalamus asper* (Schultes & J. H. Schultes) Backer ex K. Heyne

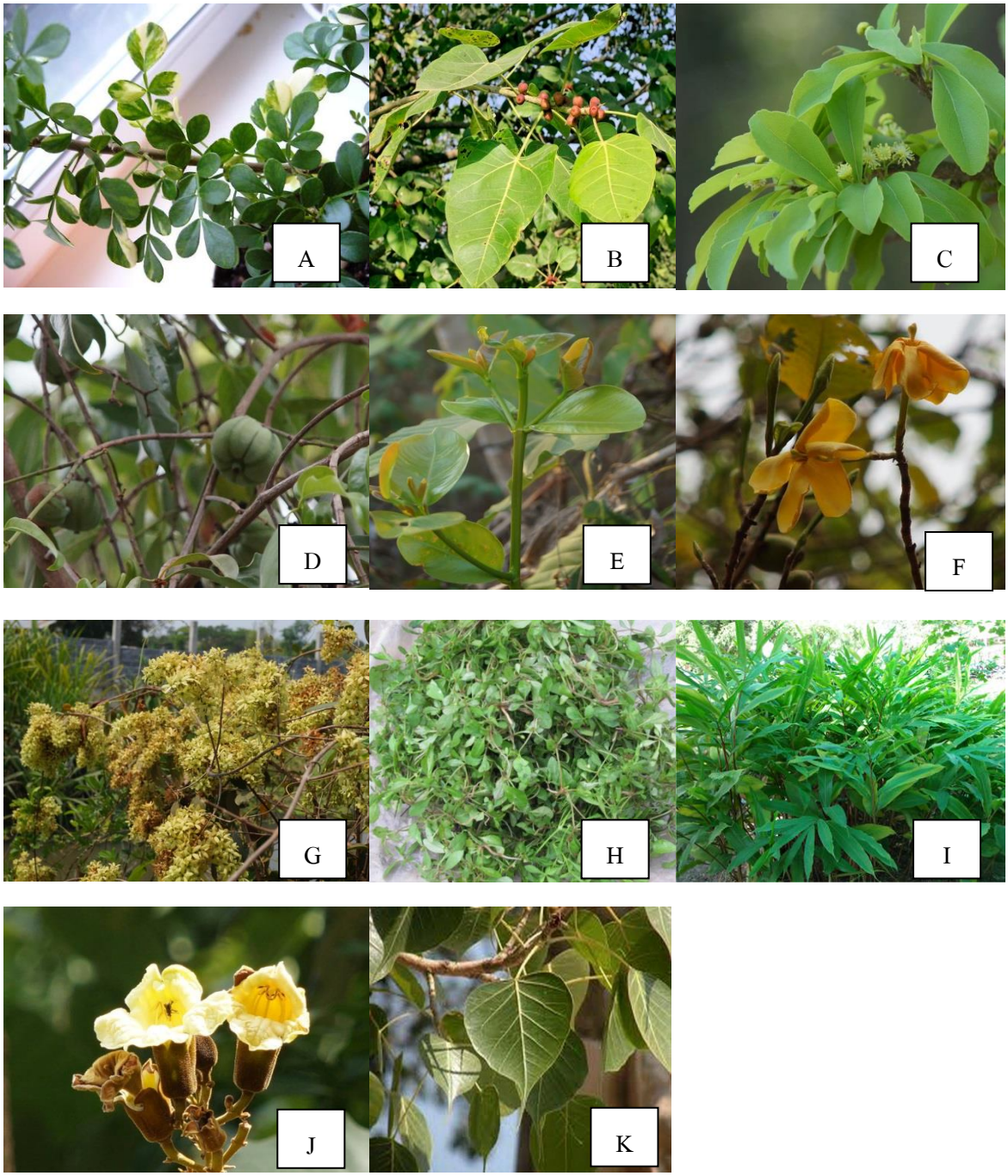


A: *Dimocarpus longan* Lour. var. *longan*
B: *Dioscorea hispida* Dennst.
C: *Diospyros ehretioides* Wall. ex G. Don
D: *Diospyros filipendula* Pierre ex Lecomte
E: *Diospyros mollis* Griff.
F: *Diospyros rhodocalyx* Kurz
G: *Dipterocarpus alatus* Roxb. ex G. Don
H: *Dipterocarpus obtusifolius* Teijsm. ex Miq.
I : *Dipterocarpus tuberculatus* Roxb.
J: *Dioscorea alata* L.
K: *Dregea volubilis* (L. f.) Benth. ex Hook. f.

Figure 4.22 *Dimocarpus longan* Lour. var. *longan* - *Dregea volubilis* (L. f.) Benth. ex Hook. f.

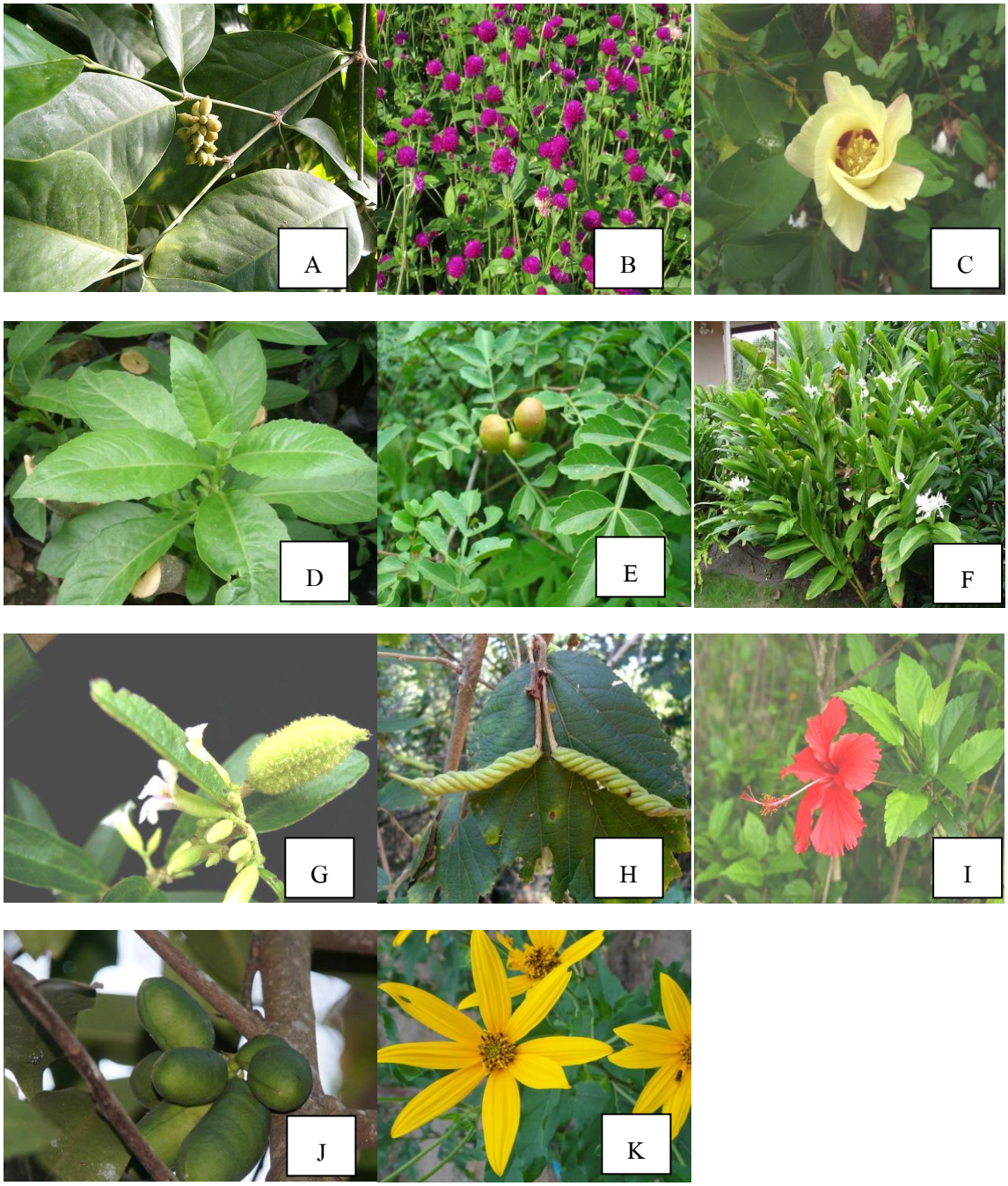
A: *Dischidia nummularia* R. Br.
B: *Dolichandrone columnaris* Santisuk
C: *Drynaria quercifolia* (L.) Sm.
D: *Elaeocarpus hygrophilus* Kurz
E: *Elephantopus scaber* L. var. *scaber*
F: *Eryngium foetidum* L.
G: *Erythrina variegata* L.
H: *Euphorbia tirucalli* L.
I : *Fagraea fragrans* Roxb.
J: *Dregea volubilis* (L. f.) Benth. ex Hook. f.
K: *Ensete glaucum* (Roxb.) Cheesman
L: *Euphorbia hirta* L.

Figure 4.23 *Dischidia nummularia* R. Br. - *Euphorbia hirta* L.



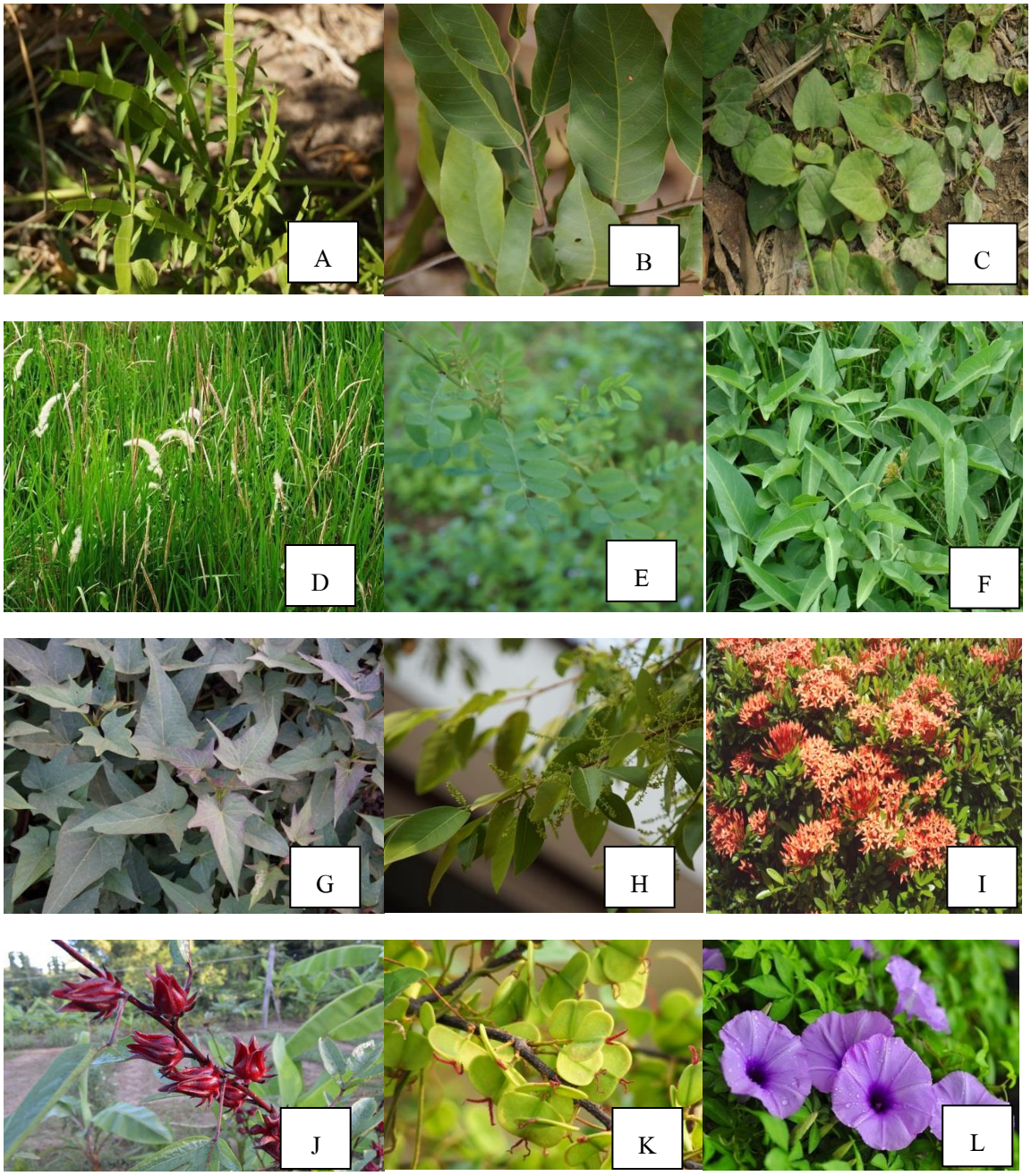
A: *Feroniella lucida* (Scheff.) Swingle
B: *Ficus racemosa* Linn
C: *Flacourtia indica* indica (Burm. f.) Merr.
D: *Garcinia cowa* Roxb. ex Choisy
E: *Garcinia nigrolineata* Planch. ex T. Anderson
F: *Gardenia obtusifolia* Roxb. ex Hook. f.
G: *Getonia floribunda* Roxb
H: *Glinus oppositifolius* (L.) A. DC.
I : *Globba winitii* C. H. Wright
J: *Fernandoa adenophylla* (Wall. ex G. Don) Steenis
K: *Ficus religiosa* L.

Figure 4.24 *Feroniella lucida* (Scheff.) Swingle - *Ficus religiosa* L.



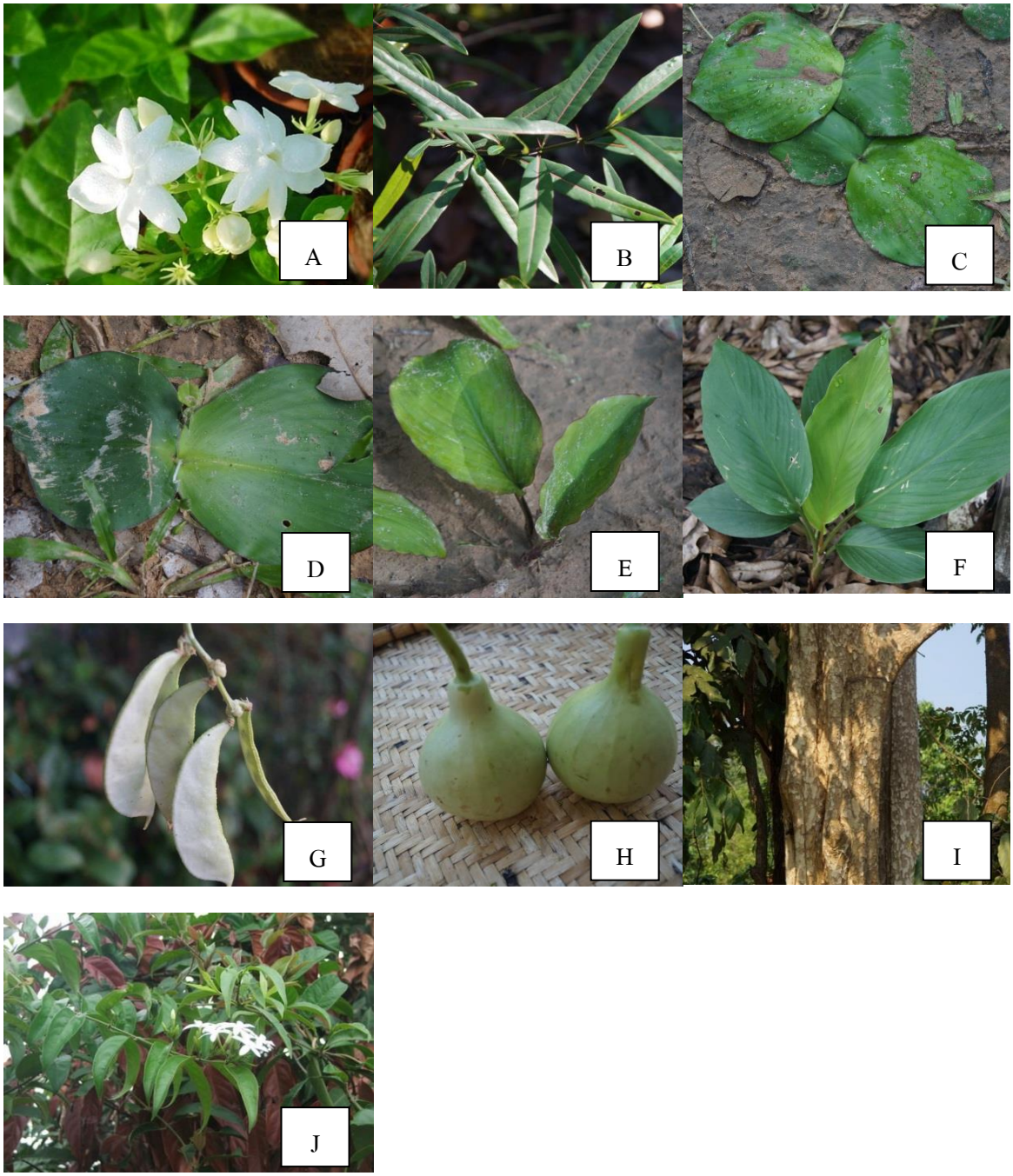
A: *Gnetum macrostachyum* Hook. f.
B: *Gomphrena globosa* L.
C: *Gossypium herbaceum* L.
D: *Gynura procumbens* (Lour.) Merr.
E: *Harrisonia perforate* (Blanco) Merr.
F: *Hedychium coronarium*
G: *Helicteres angustifolia* L.
H: *Helicteres isora* L.
I : *Hibiscus rosa-sinensis* L.
J : *Goniothalamus laoticus* (Finet & Gagnep.) Bân
K: *Helianthus tuberosus* L.

Figure 4.25 *Gnetum macrostachyum* Hook. f.- *Helianthus tuberosus* L.



A: *Homalocladium platycladum* (F. Muell.) L. H. Bailey
B: *Hopea odorata* Roxb.
C: *Houttuynia cordata* Thunb
D: *Imperata cylindrica* (L.) Raeusch.
E: *Indigofera tinctoria L.*
F: *Ipomoea aquatica* Forsk.
G: *Ipomoea batatas* (L.) Lam.
H: *Irvingia malayana* Oliv. ex A. W. Benn.
I: *Ixora cambodiana* Pit.
J: *Hibiscus sabdariffa* L.
K: *Hymenocardia punctata* Wall. ex Lindl.
L: *Ipomoea cairica* (L.) Sweet

Figure 4.26 *Homalocladium platycladum* (F. Muell.) L. H. Bailey - *Ipomoea cairica* (L.) Sweet

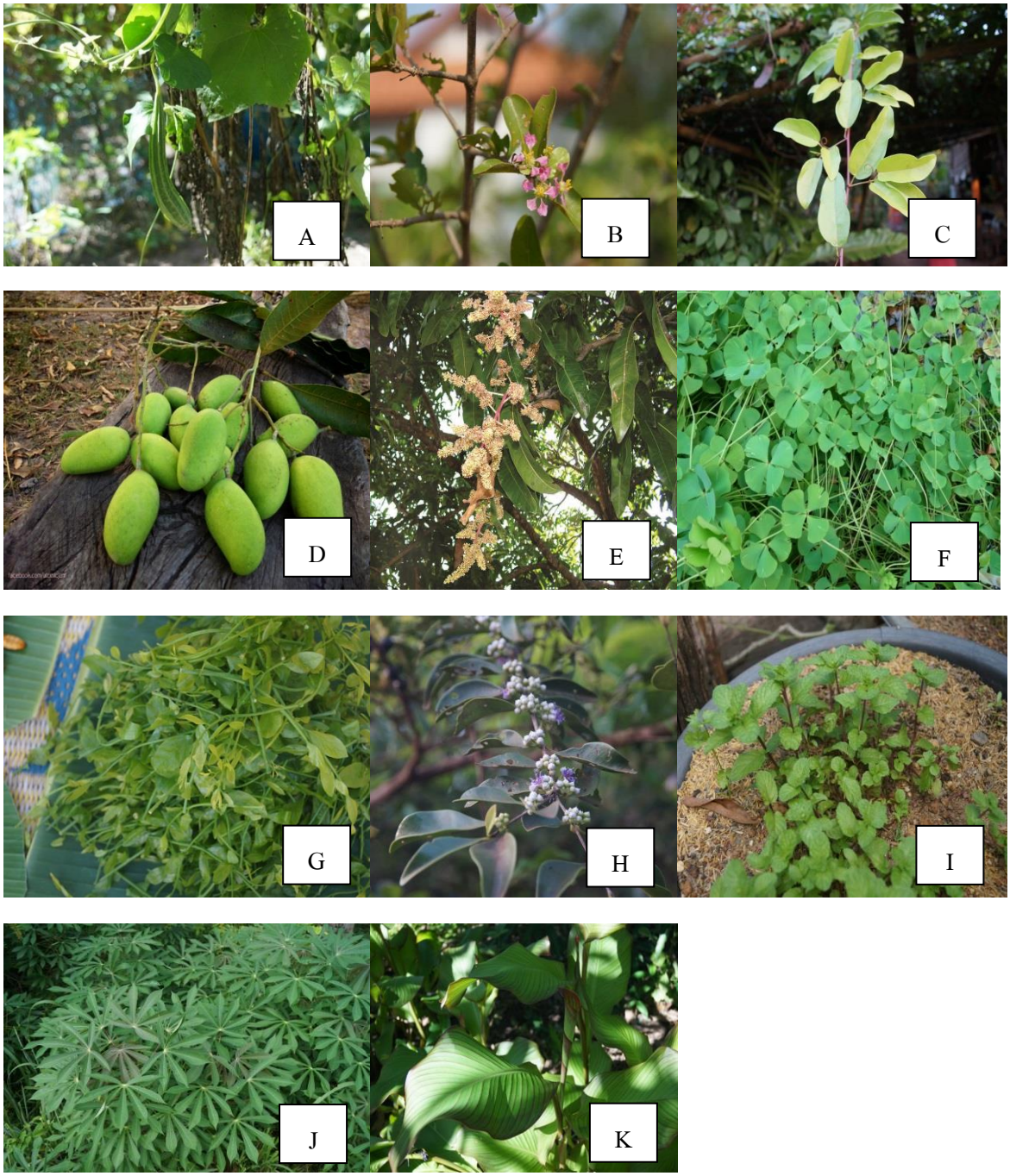


A: *Jasminum sambac* (L.) Aiton
B: *Justicia gendarussa* Burm. f.
C: *Kaempferia galanga* L.
D: *Kaempferia marginata* Carey ex Roscoe
E: *Kaempferia parviflora Wall. ex Baker*
F: *Kaempferia rotunda* L.
G: *Lablab purpureus* (L.) Sweet
H: *Lagenaria siceraria* (Molina) Standl.
I: *Lagerstroemia floribunda* Jack var. *floribunda*
J: *Jasminum anodontum* Gagnep.

Figure 4.27 *Jasminum sambac* (L.) Aiton - *Jasminum anodontum* Gagnep.

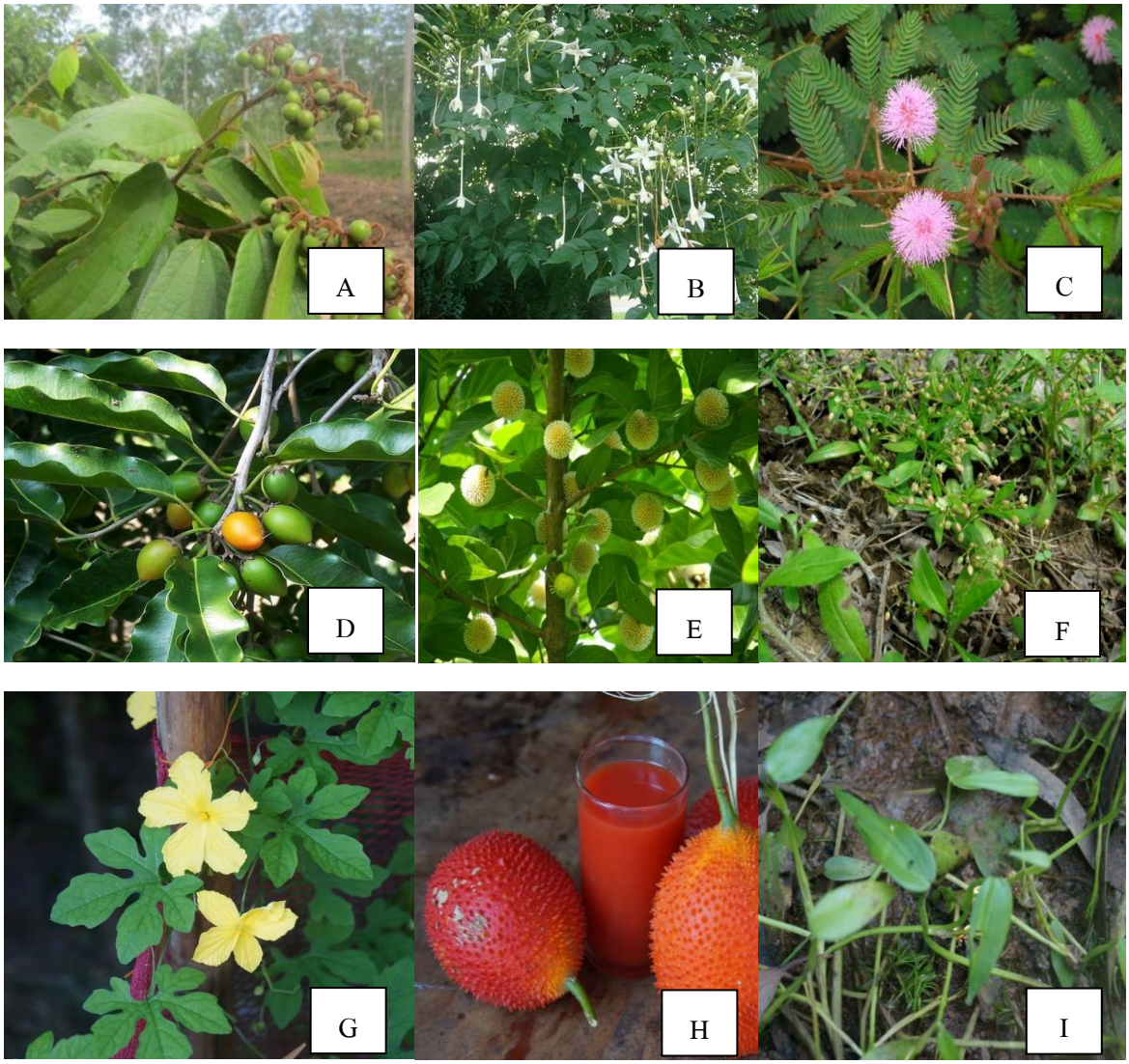
A: *Lagerstroemia speciosa* (L.) Pers.
B: *Lasia spinosa* Thw.
C: *Lawsonia inermis L.*
D: *Leea thorelii* Gagnep.
E: *Lepisanthes rubiginosa* (Roxb.) Leenh.
F: *Leucaena leucocephala* (Lam.) de Wit
G: *Limnocharis flava* Buch.
H: *Limnophila aromatica* (Lam.) Merr.
I: *Litsea glutinosa* (Lour.) C. B. Rob.

Figure 4.28 *Lagerstroemia speciosa* (L.) Pers. - *Litsea glutinosa* (Lour.) C. B. Rob.



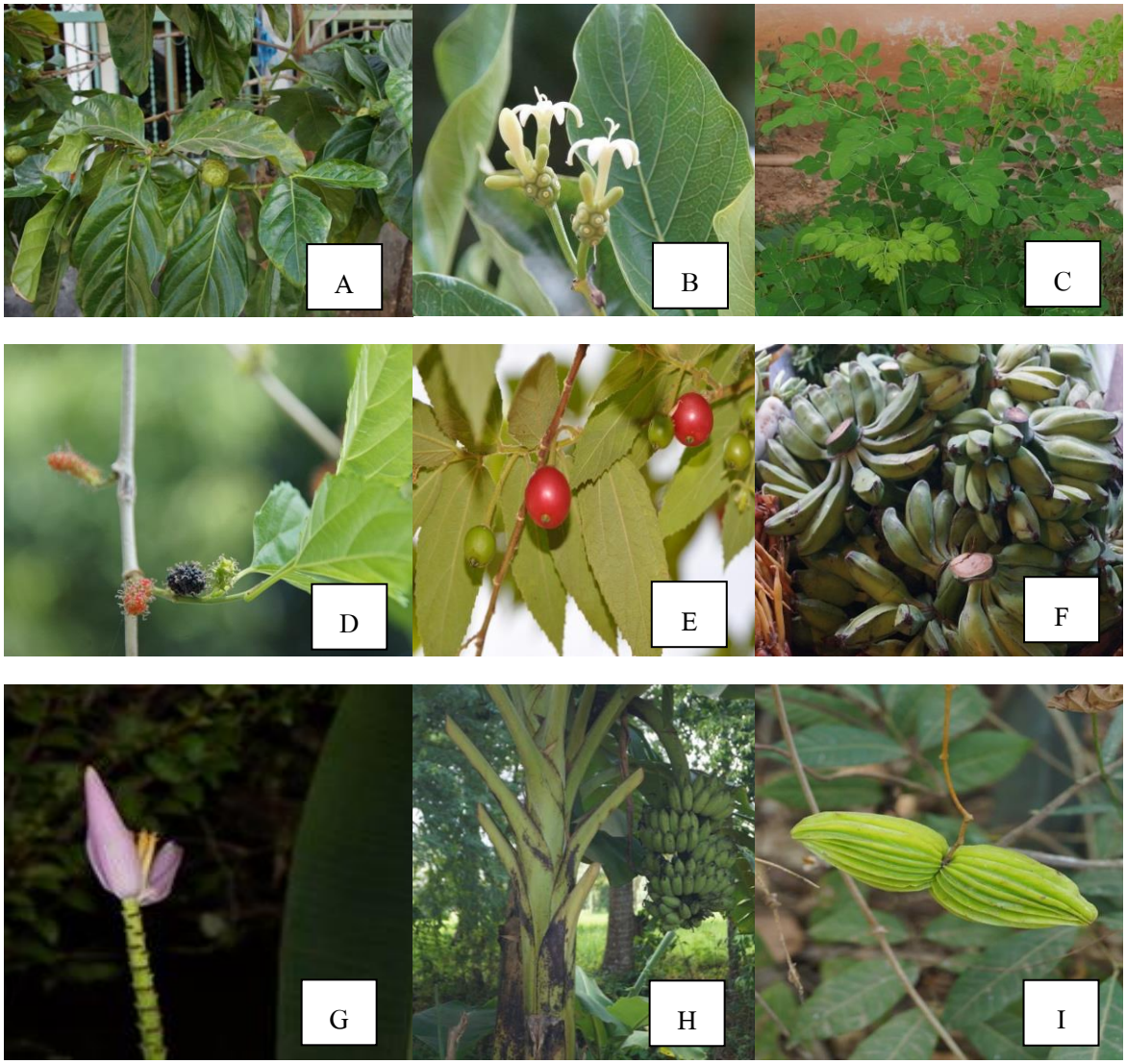
A: *Luffa acutangula* Roxb.
B: Malpighia glabra L.
C: *Lysiphyllum strychnifolium* (Craib) A. Schmitz
D: *Mangifera caloneura* Kurz
E: *Mangifera indica* L.
F: *Marsilea crenata C. Presl*
G: *Melientha suavis* Pierre
H: *Memecylon edule* Roxb.
I: *Mentha cordifolia* Opiz ex Fresen ex Fresen
J: *Manihot esculenta* Crantz
K: *Maranta arundinacea* L.

Figure 4.29 *Luffa acutangula* Roxb. - *Maranta arundinacea* L.



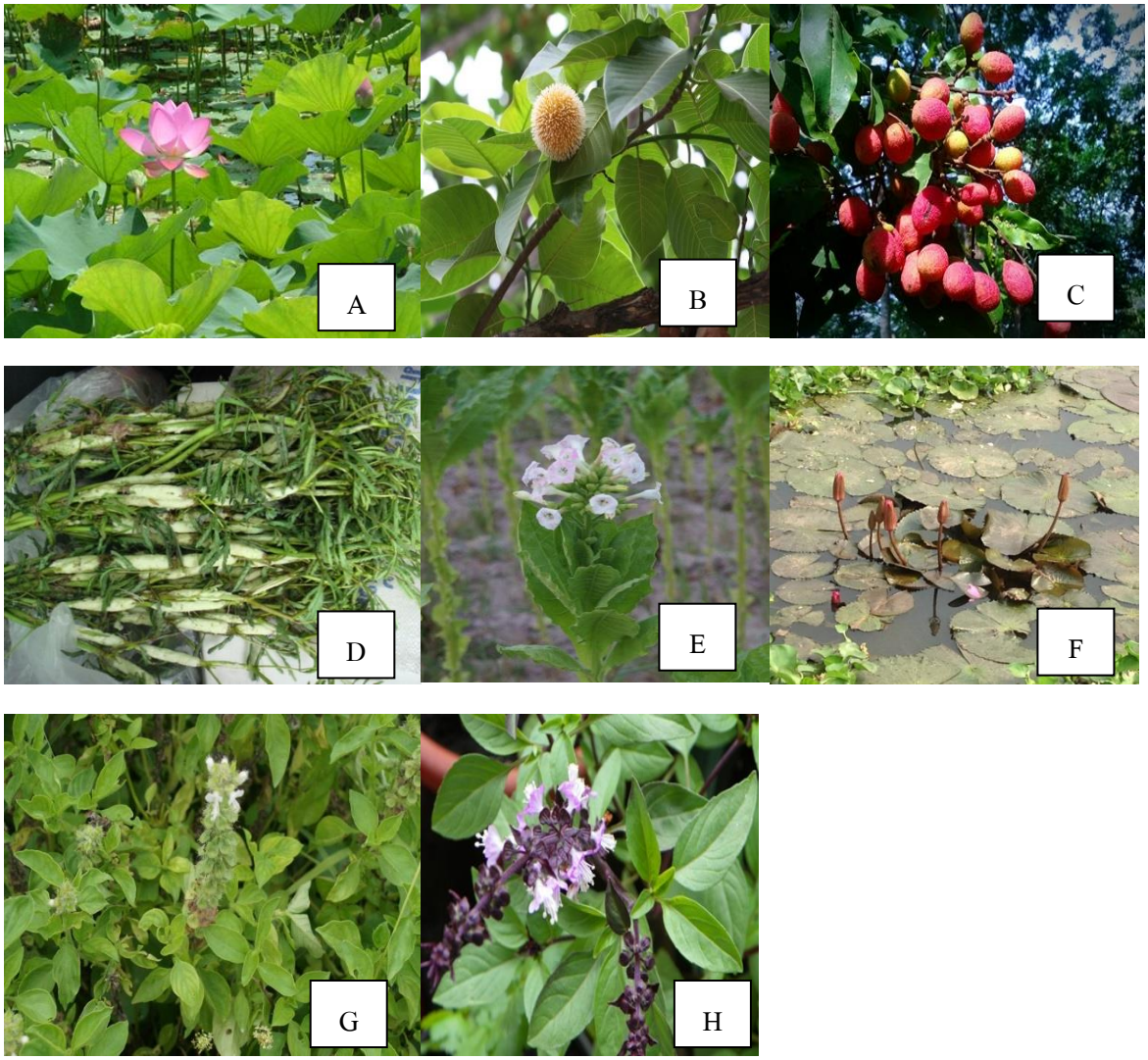
A: *Microcos tomentosa* Sm.
B: *Millingtonia hortensis* L. f.
C: *Mimosa pudica* L.
D: *Mimusops elengi* L.
E: *Mitragyna diversifolia* (Wall. ex G. Don) Havil.
F: *Mollugo pentaphylla* Linn.
G: *Momordica charantia* L.
H: *Momordica cochinchinensis* (Lour.) Spreng.
I : *Monochoria vaginalis* Presl var. plantaginea Solms

Figure 4.30 *Microcos tomentosa* Sm. - *Monochoria vaginalis* Presl var. plantaginea Solms



A: *Morinda citrifolia* L.
B: *Morinda coreia* Buch.-Ham.
C: *Moringa oleifera* Lam.
D: *Morus alba* L.
E: *Muntingia calabura* L.
F: *Musa balbisiana* Colla
G: *Musa ornata* Roxb.
H: *Musa sapientum* L. *(Musa* × *paradisiaca* L.*)*
I: *Myriopteron extensum* (Wight & Arn.) K. Schum.

Figure 4.31 *Morinda citrifolia* L. - *Myriopteron extensum* (Wight & Arn.) K. Schum.

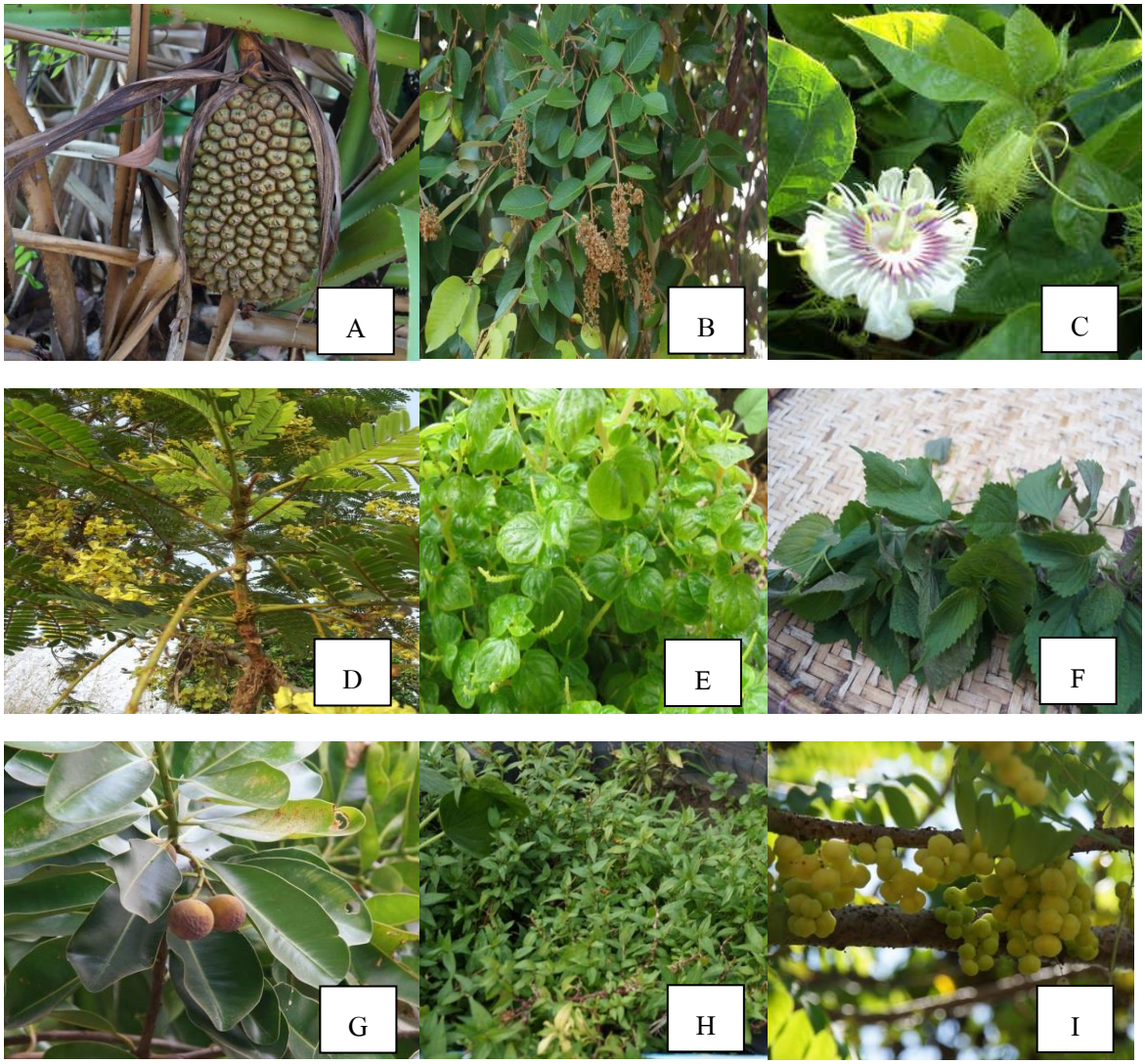


A: *Nelumbo nucifera* Gaertn.
B: *Neolamarckia cadamba* (Roxb.) Bosser
C: *Nephelium hypoleucum* Kurz
D: *Neptunia oleracea* Lour.
E: *Nicotiana tabacum* L.
F: *Nymphaea pubescens* Willd
G: *Ocimum africanum* Lour.
H: *Ocimum basilicum* L.

Figure 4.32 *Nelumbo nucifera* Gaertn. - *Ocimum basilicum* L.

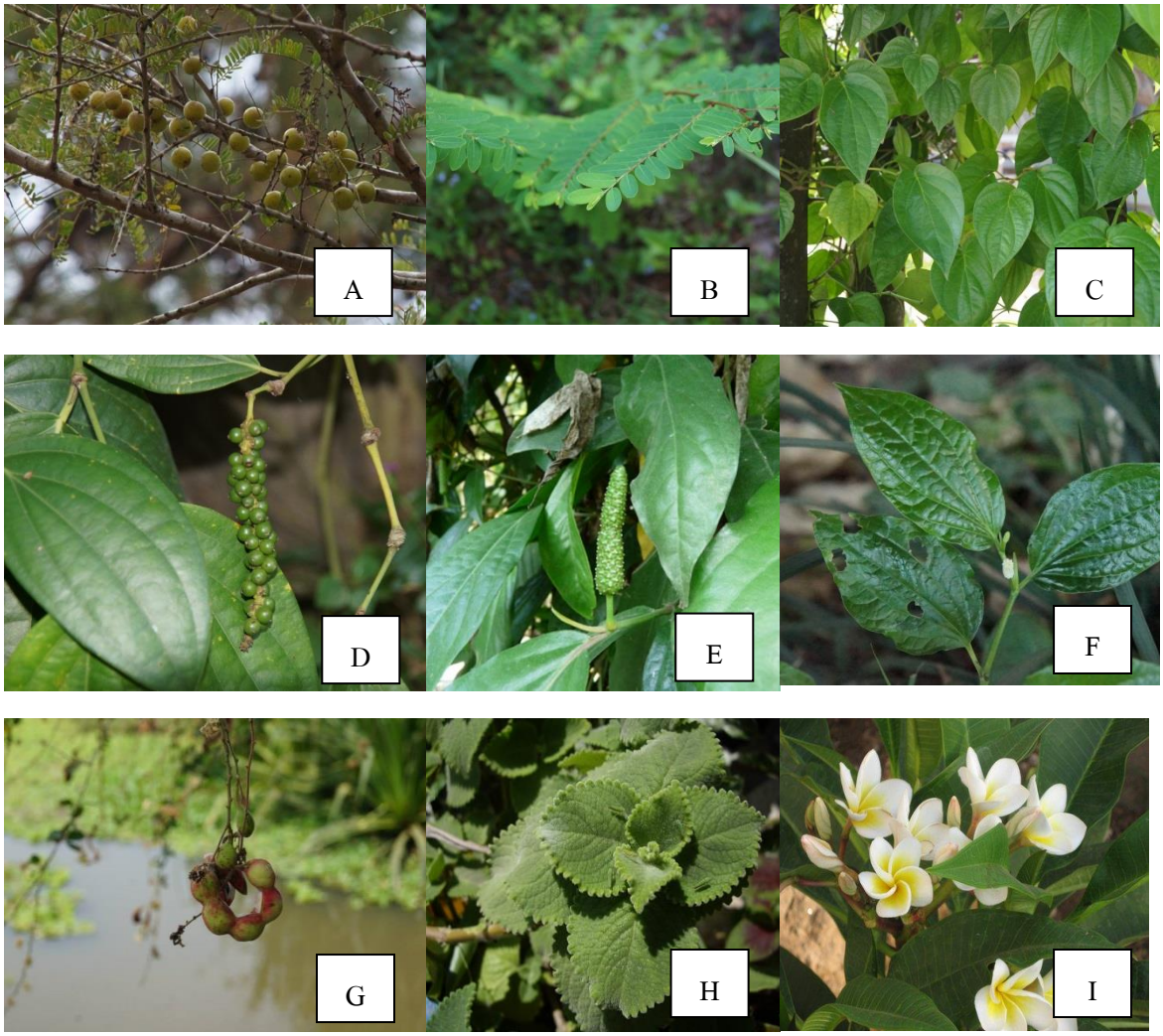
A: *Ocimum tenuiflorum* L.
B: *Pandanus amaryllifolius* Roxb.
C: *Oroxylum indicum* (L.) Benth. ex Kurz
D: *Orthosiphon aristatus* (Blume) Miq.
E: *Oryza sativa L.*
F: *Oxyceros horridus* Lour.
G: *Pachyrhizus erosus* (L.) Urb.
H: *Paederia linearis* Hook. f.

Figure 4.33 *Ocimum tenuiflorum* L. - *Paederia linearis* Hook. f.



A: *Pandanus kaida* Kurz
B: *Parinari anamensis* Hance
C: *Passiflora laurifolia* L.
D: *Peltophorum dasyrrhachis* (Miq.) Kurz
E: *Peperomia pellucida* (L.) Kunth
F: *Perilla frutescens* (L.) Britton
G: *Persea kurzii* Kosterm.
H: *Persicaria odorata* (Lour.) Soják
I: *Phyllanthus acidus* (L.) Skeels

Figure 4.34 *Pandanus kaida* Kurz - *Phyllanthus acidus* (L.) Skeels

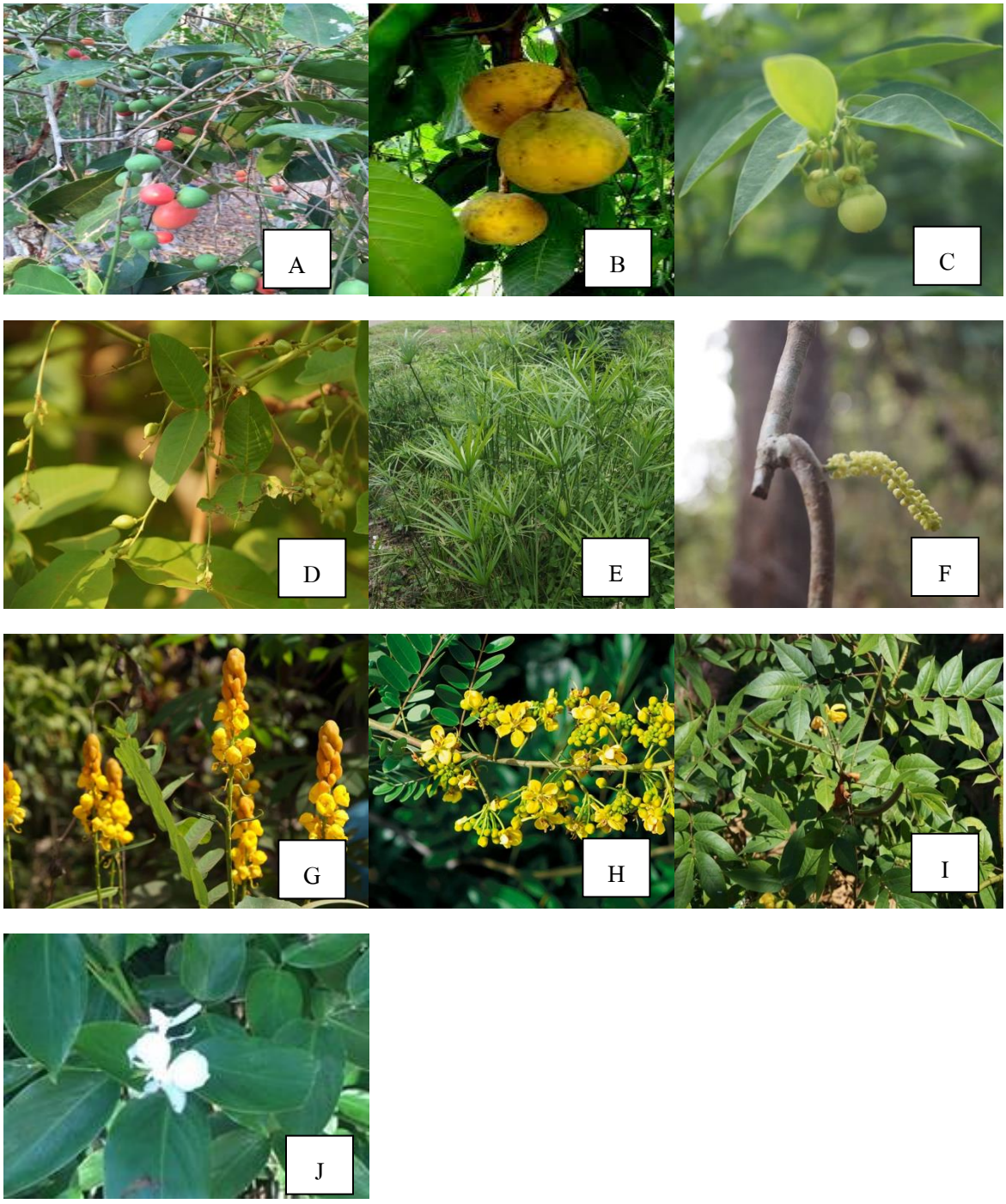


A: *Phyllanthus emblica* L.
B: *Phyllanthus virgatus* G. Forst.
C: *Piper betle* L.
D: *Piper nigrum* L.
E: *Piper retrofractum* Vahl
F: *Piper rostratum* Roxb.
G: *Pithecellobium dulce* (Roxb.) Benth.
H: *Plectranthus amboinicus* (Lour.) Spreng.
I : *Plumeria obtusa* L.

Figure 4.35 *Phyllanthus emblica* L. - *Plumeria obtusa* L.

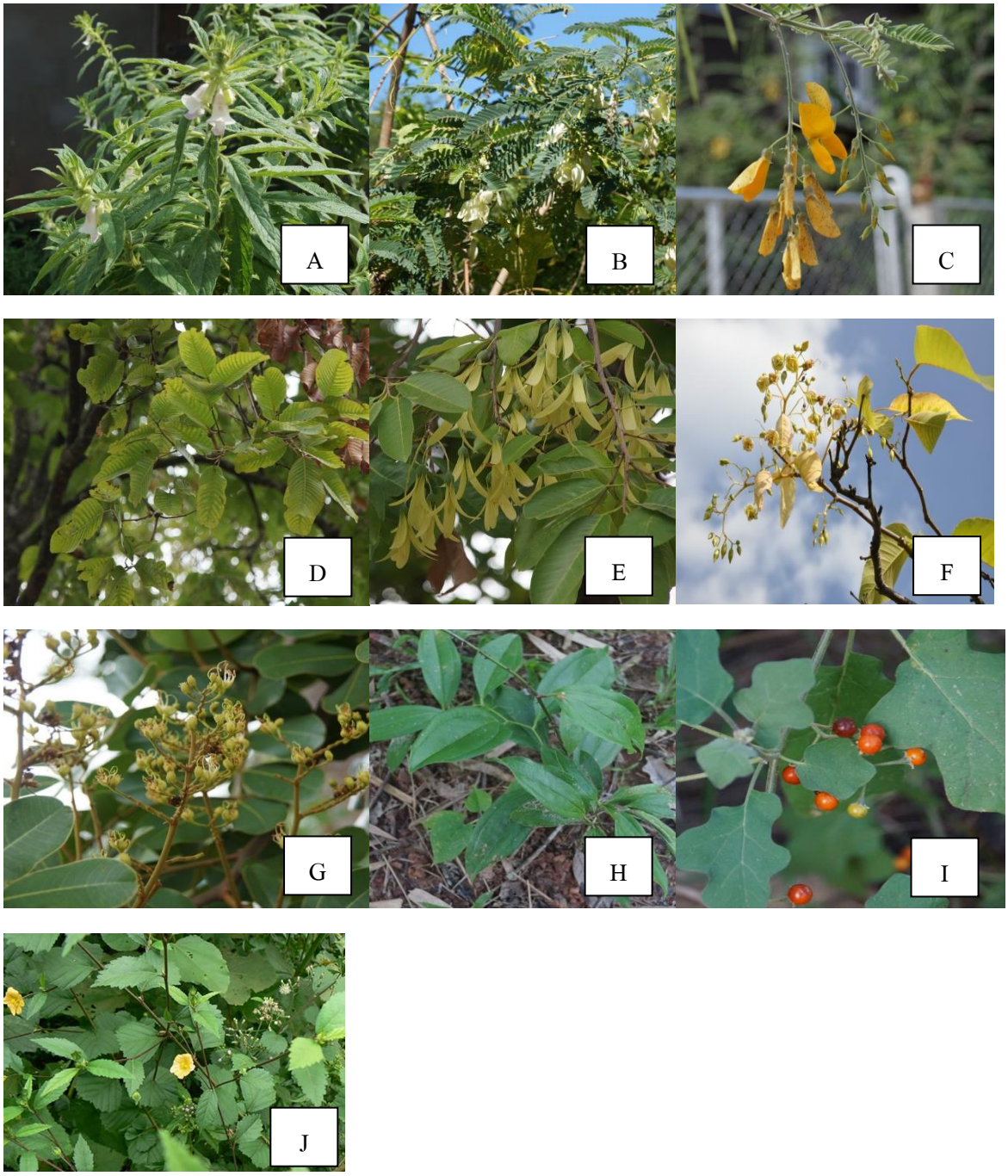
A: *Polyalthia evecta* (Pierre) Finet & Gagnep. B:. *Psidium guajava* L.
C: *Psophocarpus tetragonolobus* (L.) DC. D: *Pterocarpus indicus* Willd.
E: *Punica granatum* L. var. *granatum* F: *Rhapis laosensis* Becc.
G: *Rhinacanthus nasutus* (L.) Kurz
H: *Rhodamnia dumetorum* (DC.) Merr. & L. M. Perry
I: *Saccharum officinarum* L. J : *Pouteria campechiana* (Kunth) Baehni
K: *Ricinus communis* L. L: *Roureopsis stenopetala* (Griff.) G. Schellenb.

Figure 4.36 *Polyalthia evecta* (Pierre) Finet & Gagnep. - *Roureopsis stenopetala* (Griff.) G. Schellenb.



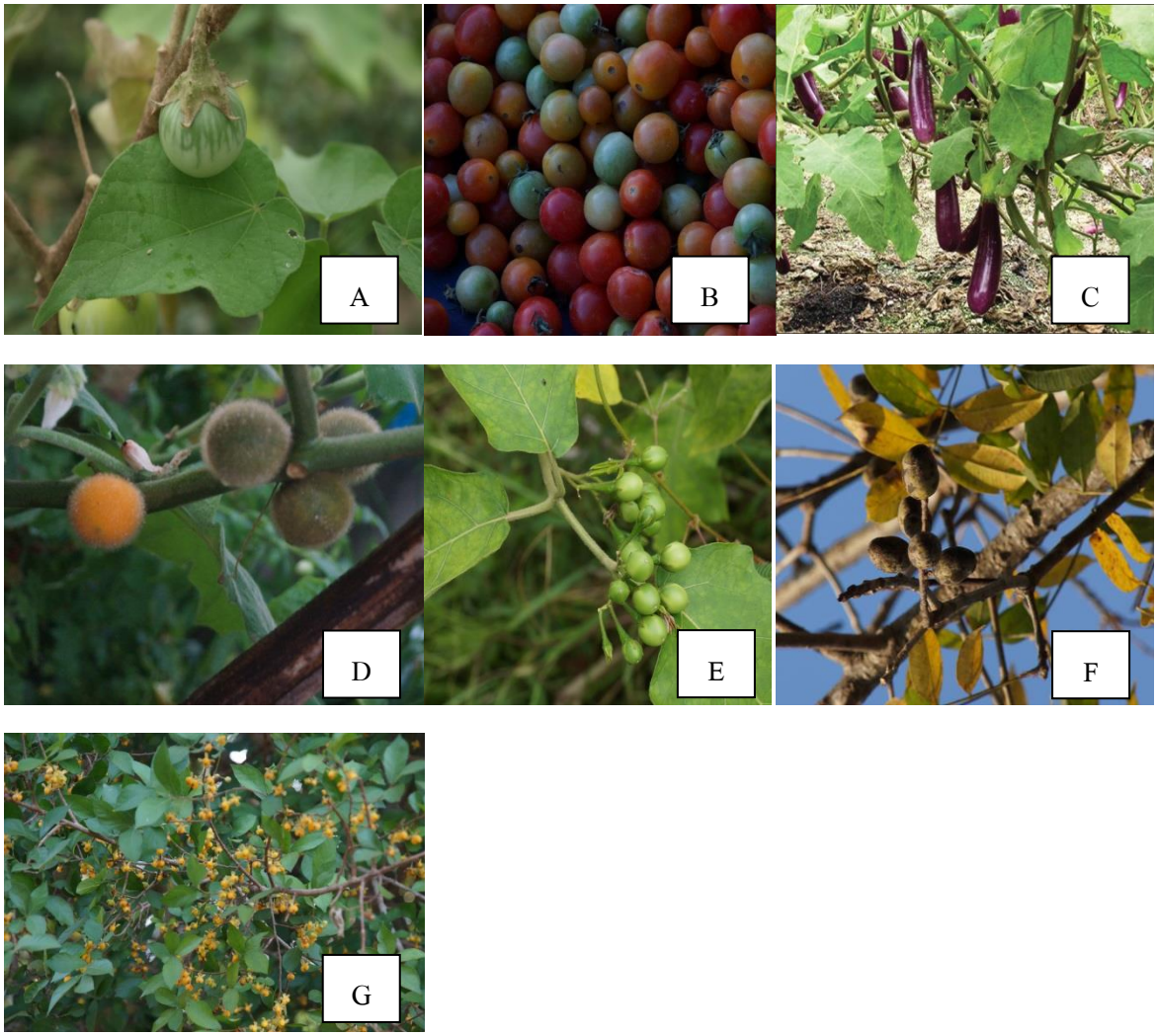
A: *Salacia chinensis* L.
B: *Sandoricum koetjape* (Burm. f.) Merr.
C: *Sauropus androgynus* (L.) Merr.
D: *Schleichera oleosa* (Lour.) Merr.
E: *Schoenoplectiella mucronata* (L.) J. Jung & H. K. Choi
F: *Scleropyrum pentandrum* (Dennst.) Mabb.
G: *Senna alata* (L.) Roxb.
H: *Senna siamea* (Lam.) H. S. Irwin & Barneb
I: *Senna tora* (L.) Roxb.
J: *Schumannianthus dichotomus* (Roxb.) Gagnep.

Figure 4.37 *Salacia chinensis* L. - *Schumannianthus dichotomus* (Roxb.) Gagnep.



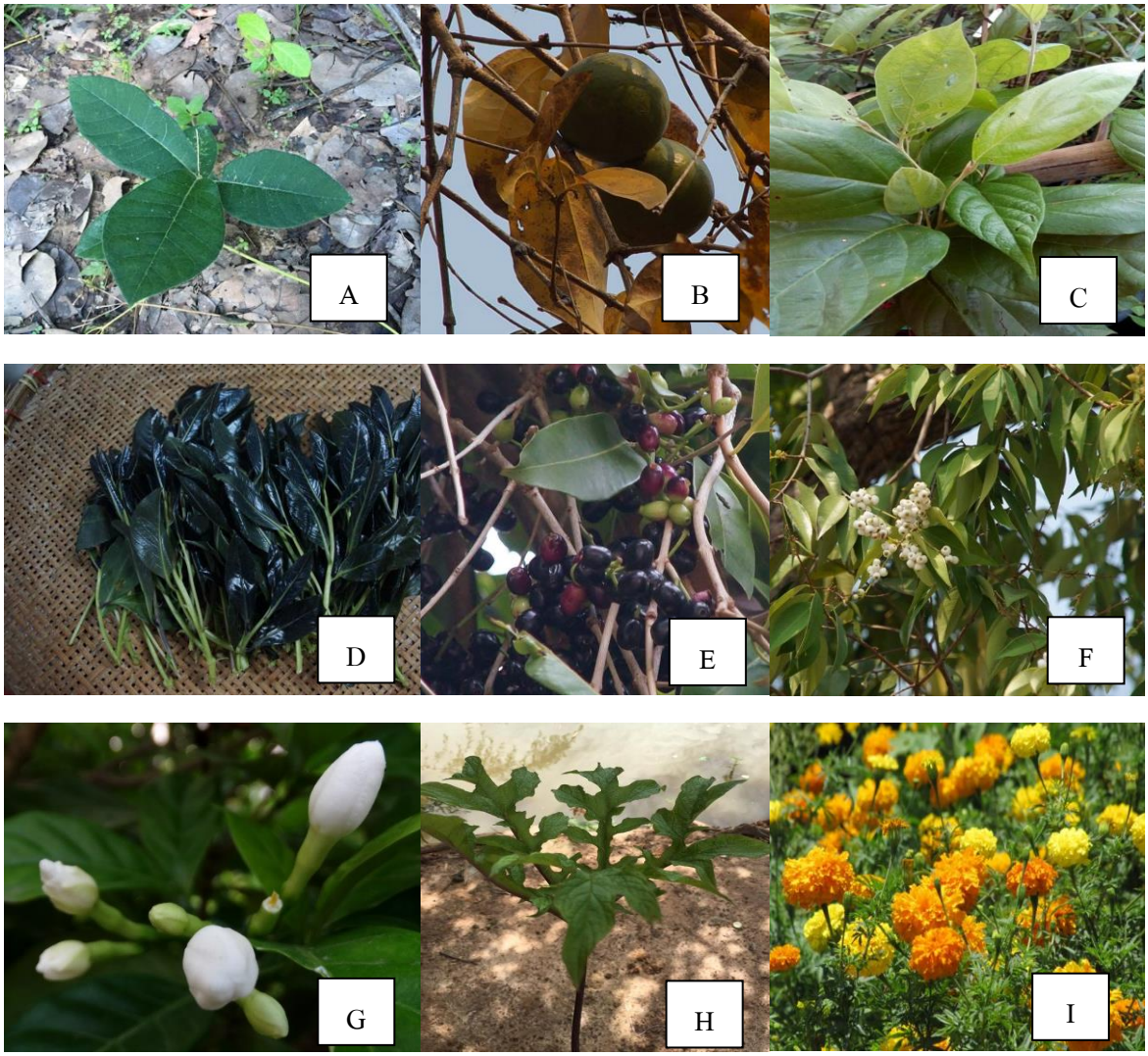
A: *Sesamum indicum* L.
B:. *Sesbania grandiflora* (L.) Poir.
C: *Sesbania javanica* Miq.
D: *Shorea obtusa* Wall. ex Blume
E: *Shorea roxburghii* G. Don
F: *Shorea siamensis* Miq.
G: *Sindora siamensis* Teijsm. ex Miq. var. *siamensis*
H: *Smilax glabra* Roxb.
I : *Solanum anguivi* Lam.
J : *Sida rhombifolia* L. subsp. *rhombifolia*

Figure 4.38 *Sesamum indicum* L. - *Sida rhombifolia* L. subsp. *rhombifolia*



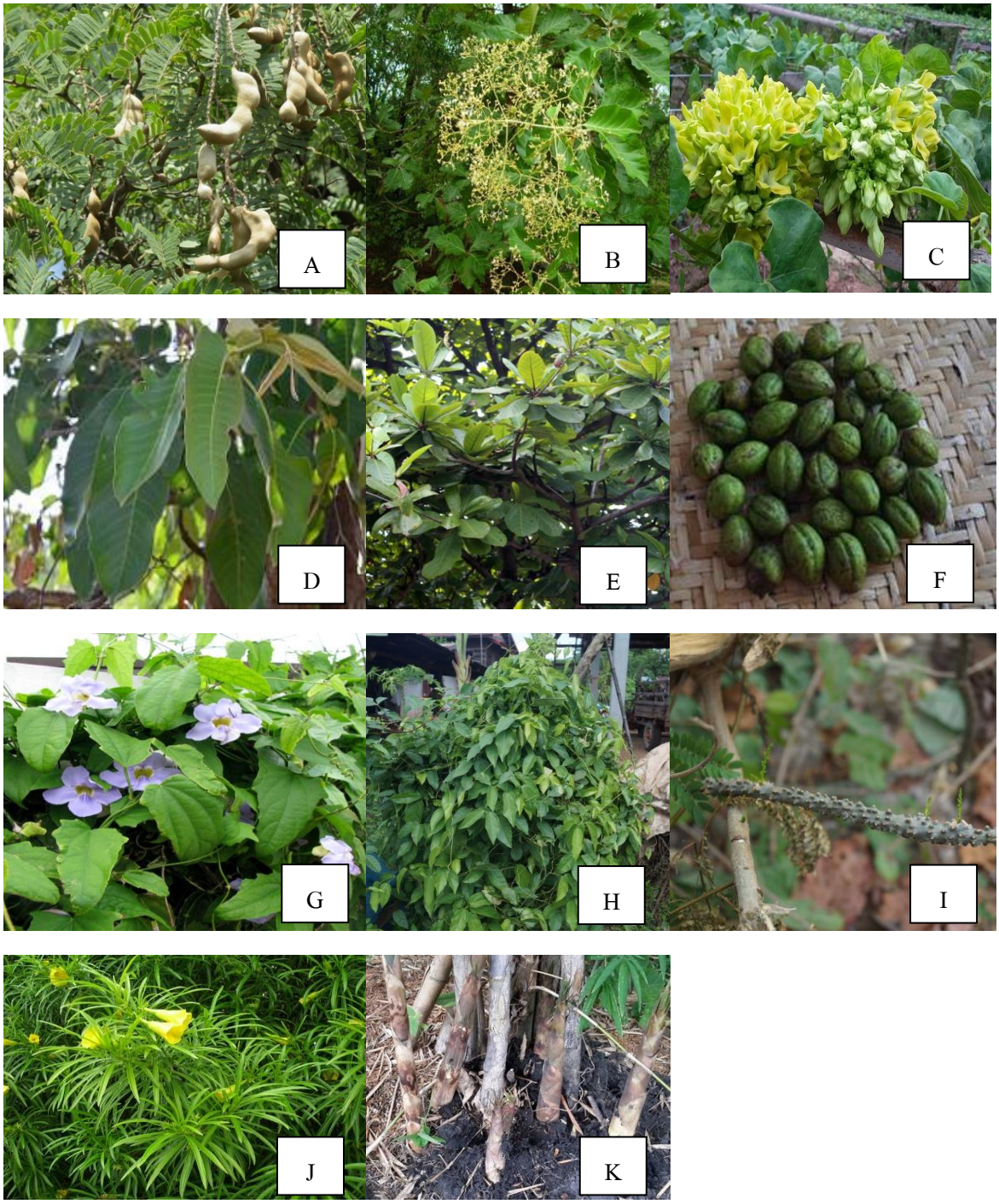
A: *Solanum incanum* L.
B: *Solanum lycopersicum* L.
C: *Solanum melongena* L.
D: *Solanum stramoniifolium* Jacq.
E: *Solanum torvum* Sw.
F: *Spondias pinnata* (L. f.) Kurz
G: *Streblus asper*

Figure 4.39 *Solanum incanum* L.- *Streblus asper*



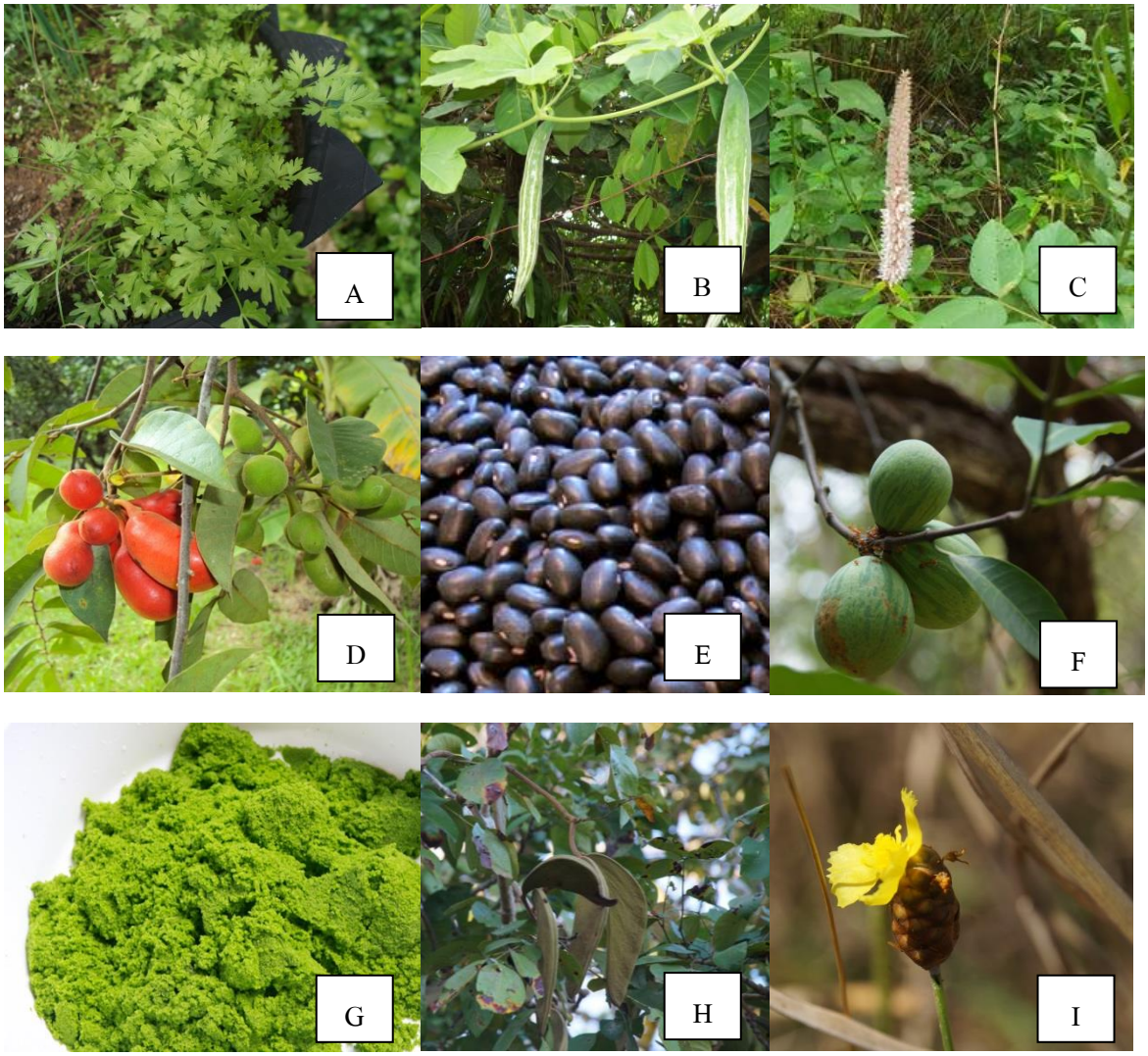
A: *Streptocaulon juventas* (Lour.) Merr.
B: *Strychnos nux-vomica* L.
C: *Styrax benzoides Craib*
D: *Symplocos racemosa* Roxb.
E: *Syzygium cinereum* (Kurz) Chantar. & J. Parn.
F: *Syzygium grata* Wight *(Syzygium antisepticum* (Blume) Merr. & L. M. Perry)
G: *Tabernaemontana pandacaqui* Lam.
H: *Tacca leontopetaloides* (L.) Kuntze
I : *Tagetes erecta* L.

Figure 4.40 *Streptocaulon juventas* (Lour.) Merr. - *Tagetes erecta* L.



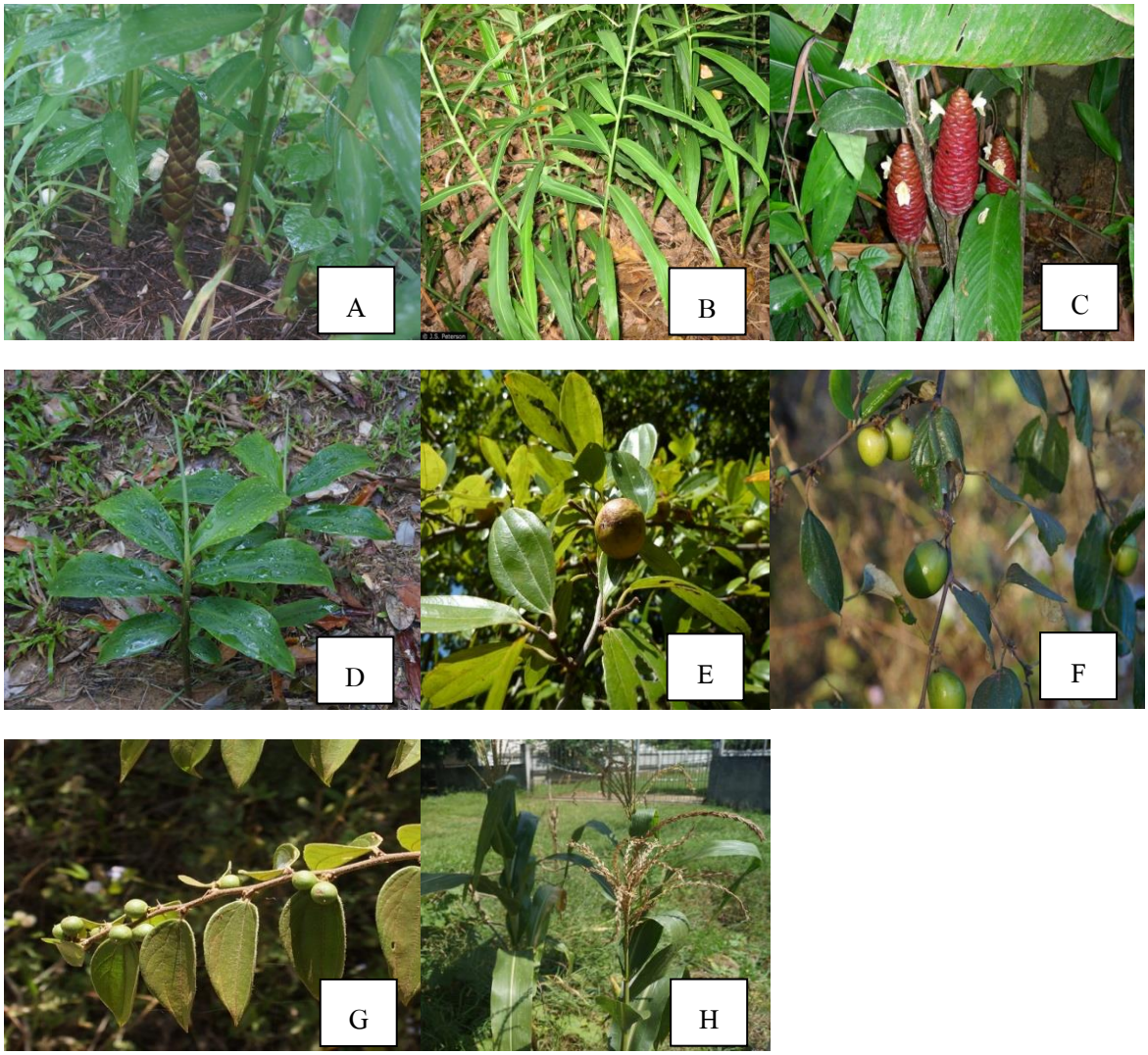
A: *Tamarindus indica* L.
B: *Tectona grandis* L. f.
C: *Telosma cordata* (Burm. f.) Merr.
D: *Terminalia alata* B. Heyne ex Roth
E: *Terminalia catappa* L.
F: *Terminalia chebula* Retz. var. *chebula*
G: *Thunbergia laurifolia* Lindl.
H: *Tiliacora triandra* (Colebr.) Diels
I: *Tinospora crispa* (L.) Hook. f. & Thomson
J: *Thevetia peruviana* (Pers.) K. Schum.
K: *Thyrsostachys siamensis* Gamble

Figure 4.41 *Tamarindus indica* L. - *Thyrsostachys siamensis* Gamble



A: *Trachyspermum roxburghianum* (DC.) H. Wolff *Coriandrum* spp.
B: *Trichosanthes cucumerina* L.
C: *Uraria crinita* (L.) Desv. ex DC.
D: *Uvaria rufa* Blume
E: *Vigna unguiculata* (L.) Walp. subsp. *unguiculata*
F: *Willughbeia edulis* Roxb.
G: *Wolffia globosa* (Roxb.) Hartog & Plas
H: *Xylia xylocarpa* (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen
I : *Xyris indica* L.

Figure 4.42 *Trachyspermum roxburghianum* (DC.) H. Wolff *Coriandrum* spp. - *Xyris indica* L.



A : *Zingiber montanum* (J. Koenig) Link ex A. Dietr.
B : *Zingiber officinale* Roscoe
C: *Zingiber ottensii* Valeton
D : *Zingiber zerumbet* (L.) Roscoe ex Sm. subsp. *zerumbet*
E : *Ziziphus cambodiana* Pierre
F : *Ziziphus jujuba* Mill.
G: *Ziziphus oenoplia* (L.) Mill. var. *oenoplia*
H: *Zea mays* L.

Figure 4.43 *Zingiber montanum* (J. Koenig) Link ex A. Dietr. - *Zea mays* L.

CHAPTER 5

CONCLUSION

5.1 Plant diversity

5.1.1 Family and plant species.

Data in this reseach was collected in Nakhon Phanom province from two hundred and ninety-two informants from seven ethnic groups: Phu Thai, Kaleung, Kha, Sak, So, Yaw and Thai I- San. There were three hundred and fifty-eight plant species in ninety-three families that the ethnic groups used in their daily lives. The largest number of plants species came from Fabaceae, followed by Zingiberaceae and Poaceae. Fabaceae was the species most used in others countries, such as in Pakistan (Abbas *et al*., 2016), and Brazil (Martin *et al*., 2015). Fabaceae is the most utilized because this plant is versatile and can be used on a daily basis in various fields such as *Senna siamea* (Lam.) H. S. Irwin & Barneby, *Xylia xylocarpa* (Roxb.) W. Theob. var. *kerrii* (Craib & Hutch.) I. C. Nielsen, and *Acacia concinna* (Willd.) DC. Two hundred and eight species were used for edible purposes, two hundred and three species for medicinal purposes, sixty-three species for cultural purposes, and eighty-three species for other uses. Most plants were used for edible elsewhere such as in Thailand (Sonsupub, 2010).

5.1.2 Cultural importance index (CI)

Musa balbisiana Colla had the highest CI, followed by *Musa* × *paradisiaca* L., and *Oryza sativa* L. While the highest CI of plant species of Phu Thai, So, Sak, Kaleung, Yaw, Kha, and Thai I- san were *Oryza sativa* L., *Musa* × *paradisiaca* L., *Musa* × *paradisiaca* L., *Oryza sativa* L., *Musa balbisiana* Colla, *Oryza sativa* L., and *Musa* × *paradisiaca* L. respectively. Rice is the staple food of Thailand as well as seven indigenous tribes. In addition, rice (*Oryza sativa* L.) is also used in the rituals and beliefs of the ethnic groups such as the merits of each month, 12 months, Yao ceremony, housewarming, wedding, and so on. Bananas (*Musa balbisiana* Colla

and *Musa* × *paradisiaca* L.) are very useful and can be used as food, medicine, rituals, and other benefits. The plant is essential to the survival of the ethnic groups

5.1.3 Plant part used, plants habit

Leaves, fruits, and stems were the plant parts most used. Tree was the most common plant habit followed by the herb and climber. Elsewhere, leaves were most frequently used plant parts such as in India (Namsa *et al*., 2011), and Turkey (Arı *et al*., 2015). Leaves were commonly used because the collected leaves are simple and provide useful substances within the leaves. Most plants were planted more than collected from the forest around the village and this method is also easy for plant genetic conservation and utilization. Tree was the most common plant habit because the forest in Nakhon Phanom province is mostly dry dipterocarp forest, so most plants are trees, such as in Lao PDR (Whitney *et al*., 2011).

5.2 Gender, age, and ethnobotanical knowledge

The t-test results show that there are no significant differences between females and males ($p>.05$). Indigenous knowledge between ages is different significantly at the 0.05 level. Older informants had significantly more understanding of indigenous knowledge than younger informants. And the indigenous knowledge among the ethnic groups did not differ significantly ($p>.05$). Elsewhere, such as in China (Geng *et al*. 2016), the age was found to have a significant effect on TK, but there was no significant difference between male and female informants in their level of knowledge. The traditional knowledge was dynamic and affected by social factors. Also, it was descending partly among younger generations in Baidi.

5.3 Comparative studies on ethnobotany

5.3.1 Edible plants

The study found that edible plants used among the seven ethnic groups in Nakhon Phanom Province derived from found two hundred species from eventy one

families. The top three most common species are Fabaceae (twenty-three species), Zingiberaceae (sixteen species), and Poaceae (eleven species), respectively.
The similarities of edible plant species use between Phu Thai and Yaw were the highest, while the uses between Kaleung and Phu Thai, and between Yaw and Kha had the lowest similarities. Because the climate and topography are no different, edible plants are quite similar within the ethnic groups. Phu Thai had the highest similarities to Yaw because they live near each other.

5.3.2 Medicinal plants

All two hundred species in seventy five families were utilized as medicine and the most common species are Fabaceae (twenty eight species), followed by Zingiberaceae (fifteen species), Malvaceae, and Lamiaceae (nine species each), respectively.The similarities of medicinal plant use between Phu Thai and Yaw were the highest, while Kaleung and Sak had the lowest similarities. Phu Thai and Yaw have high similarities because both ethnic groups live close to each other. Kaleung differs from other tribes because of a distant settlement from the other six ethnic groups.

5.3.3 Cultural plants

The plants used for cultural purposes totaled sixty-three species in thirty-three families, and the most common family were Fabaceae (eight species), Zingiberaceae, Apocynacea, Poaceae, Rubiacae, and Zigiberacea (four species each) respectively.The similarities of cultural plant use between Kaleung and Yaw, and between Kha and Sak were the highest, while Phu Thai and Kalerng had the lowest similarities. Phu Thai, Kha, Sak, and So have their own culture, traditions, and distinctive identity, such as language, beliefs and, traditions. The rituals and beliefs using indigenous plants are similar. Traditions of Phu Thai, such as Phu Thai dance, the tradition of welcoming visitors, the traditional healthcare spirit, traditions of Kha, such as the tradition of philanthropy in each month of the year, traditions of Sak, such as “Sak Ten Sak”, and traditions of So, such as “Sang san nam” and” So Tung bung” ceremony.

5.3.4 Other uses plants

There were eighty-three plant species in thirty-five plant families which were used as cultural plants among the seven ethnic groups. The commonly represented plant families for other uses plants were Fabaceae (eighteen species), Dipterocarpaceae, and Poaceae (six species each).The similarities of using plants for other purposes between Kha and Sak were the highest, while Phu Thai and Kalerng had the lowest similarities. Phu Thai, whose cultural traditions are inherited from their ancestors, are quite different from other ethnic groups. Therefore, the plants that were used for other purposes were different from the other six ethnic groups.

References

References

Abbas Z., Khan S., & Abbasi A. (2016). Ethnobotany of the Balti community, Tormik valley, Karakorum range, Baltistan, Pakistan. *Journal of Ethnobiology and Ethnomedicine*, 12(38), 1-16.

Arı S., Temel M., Kargıoğlu M., & Konuk M. (2015). Ethnobotanical survey of plants used in Afyonkarahisar-Turkey. *Journal of Ethnobiology and Ethnomedicine*, 11(84), 1-15.

Arunpipattanapong A. (2011). *Creative tourism development plan for ethnic group in Nakhon Phanom province*. (Master's thesis). Khon Kean University.

Bennett B. C. (1896). *Ethnobotany and economic botany: subject in search of definitions*. Department of Biological Sciences and Center for Ethnobiology and Natural Products, Florida International University, Miami, FL 33199 USA.

Berlin B. (1973). General principles of classification and nomenclature in folk biology. *American Anthropologist*, 75, 214-242.

Bletter N. (2007). A quantitative synthesis of the medicinal ethnobotany of the Malinké of Mali and the Asháninka of Peru, with a new theoretical framework. *Journal of Ethnobiology and Ethnomedicine*, 3(36), 12-25.

Chamratpan S. & Homchuen S. (2005) Ethnobotany in Upper Northeastern Thailand. *Bioprospecting & Ethnopharmacology*, 3(1)**,** 67-74.

Chayamarit K. (1998). *Plant Identification Guide.* Herbarium of Department of Forestry, Thailand.

Cotton C.M. (1996). *Ethnobotany : Principles and Applications*. John Wiley and Sons, England.

De Macvean A. L. E. & Pöll, E. (2002). *Ethnobotany in Vozzo, J.A. (ed). Tropical Tree Seed Manual. United States Department of Agriculture, Forest Service*. United States.

Dumrongkul S. (2003). *Encyclopedia of Ethnic Groups of Thailand*. Institute of Language and Culture for Rural. Mahidol University.

Geng Y., Zhang Y., Ranjitkar S., Huai H., & Wang Y. (2016). Traditional knowledge and its transmission of wild edibles used by the Naxi in Baidi Village, northwestYunnan province. *Journal of Ethnobiology and Ethnomedicine*, 12(10), 1-21.

Gerique A. (2006). *An introduction to ethnoecology and ethnobotany theory and methods. Integrative assessment and planning methods for sustainable agroforestry in humid and semiarid regions*. Advanced Scientific Training – Loja, Ecuador.

Giovannini P. (2011). *How to prepare herbarium specimens: short guidelines*. Retrieved from http://petergiovannini.com/how%20to%20prepare %20herbarium%20specimens%20ethnobotany/.

Given D. R. & Harris W. (1994). *Techniques and methods of ethnobotany: as an aid to the study, evaluation, conservation and sustainable use of biodiversity*. The Commonwealth Secretariat. London.

Godoy R., Reyes-Garcı´a V., Broesch, J., Fitzpatrick I., Giovannini P., Martinez-Rodriguez M., and Huanca T. (2009). Long-term (secular) change of ethnobotanical knowledge of useful plants: separating cohort and age effects. *Journal of Anthropological Research*, 65(1), 51-67.

Gomez-Beloz A. (2002). Plant use knowledge of the Winikina Warao: The case for questionnaires in Ethnobotany. *Economic Botany*, 56(3), 231-241.

Hamilton A. C., Shengji P., Kessy J., Khan, Ashiq A., Lagos-Witte S. & Shinwari Z. K. (2003). *The purposes and teaching of Applied Ethnobotany. People and Plants working paper 11*. WWF, Godalming, UK.

Harshberger J. W. (1896). The purpose of ethnobotany. *Bot. Gaz*., 21(3), 146-158.

Heinrich M. (2000). Ethnobotany and its role in drug development. *Phytotherapy research*, 14(7), 479-488.

Hoffman B.,& and Gallaher T. (2007). Important indices in ethnobotany. *Ethnobotany Research & Applications*, 5, 201-218.

Inta A. (2008). *Ethnobotany and crop diversity of Tai Lue and Akha communities in the upper northern Thailand and the Xishuangbanna Dai autonomous prefecture, China*. (Doctoral dissertation). Chiang Mai University.

Judd S. (2002). *Plant Systematic a phylogenetic approach.* Sinauer Associates,Inc. USA.

Juladalai W, Yongpithayapong P, & Rachmanee S. (2006). Knowledge Management on Local Wisdom of Tai-so Community Weaving Culture in Phone Sawan District, Nakhon Phanom Province. *GMSARN International Journal.* 3 (2009), 171 – 178.

Kayormdock W. (2007). A study on traditional Medical Knowledge of Phu Thai Ethic group in Northeasthern Thailand. (Master's thesis). Khon Kean University.

Lentini F. (2000). The role of ethnobotanics in scientific research. State of ethnobotanical knowledge in Sicily. *Fitoterapia*, 71, S83-8.

Lundh E. C. S. (2007). *Plant use in ante- and postpartum health care in Lao PDR, Department of Systematic Botany*. (Master's thesis). Uppsala University, Sweden.

Maps of world. (2012). Retrieved August 12, 2014, from http://www.mapsofworld.com/ Thailand/provinces/nakhon-phanom-map.html/.

Martin G. J. (1995). *Ethnobotany: A methods manual*. Chapman & Hall, London.

Nakhon Phanom culture office. (2014). *The ethnic groups in Nakhon Phanom province.* Retrieved August 12, 2014, from http://www. (province.mculture.go.th /nakhonphanom/word/chonpao.doc/.

Namsa D., Mandal M., Tangjang S., & Mandal S. (2011). Ethnobotany of the Monpa ethnic group at Arunachal Pradesh, India. *Journal of Ethnobiology and Ethnomedicine*, 7(31), 1-15.

Prance G.T. (1991). What is ethnobotany today?. *Journal of Ethnopharmacology*. 32(3), 209-216.

Rohlf, F.J. (2000). *NTSYSpc: Numericail Taxonomy and Multivariate Analysis system, version 2.20e*. User Guide. Exeter Software, Se tauket, New York, USA.

Smitinand T. (2014). *Thai plant names (revised edition).* Royal Forest Department, Bangkok.

Sriti K. (2012). *Comparative Ethnobotany in Nan Province,* Thailand. (Doctoral dissertation). Chiang Mai University.

Sonsupub B. (2010). *Ethnobotany of Karen Community in Raipa Village, Huaykhayeng Subdistrict, Thongphaphume District, Kanchanaburi Province*. (Master's thesis). Kasetsart University.

Tongdonae S. (2001). *Ethnobotany of Thaisongdum Community in Changwat Kanchaburi and Changwat Nakhon Pathom*. (Master's thesis). Kasetsart University.

Tardío J., Santayana M. (2007). Cultural importance indices: a comparative analysis based on the useful wild plant of southern Cantabria (northern Spain). *Economic Botany.* 1(62), 24–39. doi:10.1007/s12231-007-9004-5.

Terralingua. (2010). *Terralingua*. Retrieved August 12, 2014, from http://www.terralingua.org/html/home.html/.

Tongdonae S. (2001). *Ethnobotany of Thaisongdum Community in Changwat Kanchaburi and Changwat Nakhon Pathom*. (Master's thesis). Kasetsart University.

Trisonthi C. (2009, September). Ethnobotanical study on Doi Inthanon, Chiang Mai, Thailand. In Prasit Wangpakapattanawong (Chair), *Ethnobotany of hill-tribe people in northern Thailand*, Chiang Mai University.

Whitney C., Min V., Giang L., CanV., Barber K., & Lanh T. (2014). Conservation and Ethnobotanical Knowledge of a Hmong Community in Long Lan, Luang Prabang, Lao People's Democratic Republic. *Ethnobotany Research & Applications*, 12, 643-658.

Biography

Biography

Name	Mrs.Rapeeporn Pholhiamhan
Date of birth	10 June 1973
Place of birth	Sakol Nakhon, Thailand
Address	15 Moo 9 Phon Tong, Renu Nakhon district, Nakhon Phanom, 48170, Thailand
Position	Teacher
Place of work	Renu Nakhon Wittayanukul School, Renu Nakhon district, Nakhon Phanom, 48170, Thailand
Education	1992 Secondary school certificated, Matthayom Wanorniwas School, Sakon Nakhon , Thailand 1996 Bachelor of Education Degree (B.Ed.) in Chemistry, Udorn Thani Rajabhat Institute,Udorn Thani, Thailand 2005 Master of Education Degree (M.Ed.) in Curriculum and Instruction, Sakon Nakhon Rajabhat University, Sakon Nakhon , Thailand 2017 Doctor of Philosophy (Ph.D.) in Biodiversity, Mahasarakham University, Mahasakham, Thailand
Research grants	Research was financially supported by Mahasarakham University 2016